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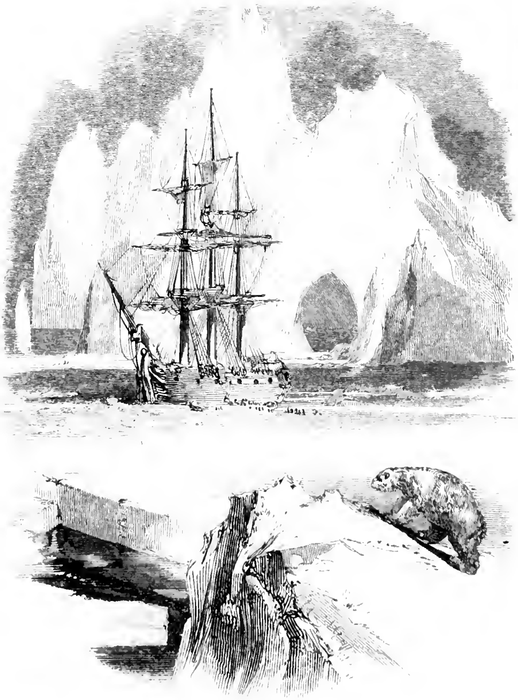

SPITZBERGEN.

THE ARCTIC REGIONS AND THE NORTHERN WHALE-FISHERY.

BY

CAPTAIN SCORESBY, F.R.S.E.

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PREFACE.

The following pages contain, in an abridged and somewhat modified form, the substance of the first volume of captain (now the rev. Dr.) Scoresby's work on the Arctic Regions and the Whale-fishery, Edinburgh, 1820; with the omission of the third chapter on the Hydrographical Survey of the Greenland Sea. It is now issued by the kind permission of the author; and a wider circulation may thus be secured for the interesting contents of his volumes than they could receive in their original and more costly form. Some few materials have also been collated from the valuable papers by the same author contributed to the "Edinburgh Philosophical Journal."

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REMARKS ON THE CELEBRATED QUESTION OF THE EXISTENCE OF A SEA COMMUNICATION BETWEEN THE ATLANTIC AND PACIFIC OCEANS, BY THE NORTH; WITH AN ACCOUNT OF THE PROGRESS OF DISCOVERY IN THE NORTHERN REGIONS.

THE question of the existence of a navigable communication between the European and the Chinese seas, by the north, is one which has been long in agitation without being resolved, and has been often revived, with the most sanguine expectations of success, to be again abandoned as hopeless. The first attempts to reach China by sea, were made by steering along the coast of Africa toward the south, and the next, by proceeding from the European shore in a westerly direction. The former, which first proved successful, was accomplished by Vasquez de Gama, a Portuguese, in the year 1497–8; and the latter was undertaken by the renowned navigator, Columbus, in 1492.

The notion of steering to India by the north-west, as the shortest way, was suggested about the middle or latter end of the fifteenth century, by John Vaz Costa Cortereal, who performed a voyage to Newfoundland about the year 1463–4; or, according to a more general opinion, by John Cabot, the father of the celebrated Sebastian Cabot, who attempted the navigation in 1497, and perhaps also in 1494–5. The idea of a passage to India by the North Pole was suggested by Robert Thorne, merchant of Bristol, as early as the year 1527; and the opinion of a passage by the north-east was proposed soon afterwards.

The universal interest which has been attached to this question of a sea communication between the Atlantic and Pacific Oceans, by the north, ever since it was first suggested, about three hundred and thirty or three hundred and fifty years ago, is fully proved by the facts, that the speculation has never but once been abandoned by the nations of Europe for more than twenty-five years together, and that there have been only three or four intervals of more than fifteen years in which no expedition was sent out in search of one or other of the supposed passages, from the year 1500 down to the present time. And it is not a little surprising that, after nearly a hundred different voyages have been undertaken with a view of discovering the desired communication with the Indian seas, all of which have failed, Britain should again revive and attempt the solution of this interesting problem.

Several facts may be brought forward, on which arguments of no mean force may be founded, in support of the opinion of the existence of a sea communication by the north between Europe and China. They may be enumerated in order.

1. The prevailing current in the Spitzbergen sea flows, we are well assured, during nine months of the year, if not all the year round, from the north-east towards the south-west. The velocity of this current may be from five to twenty miles per day, varying in different situations, but is most considerable near the coast of Old Greenland. The current, on the other hand, in the middle of Behring's Strait, as observed by lieutenant Kotzebue, sets strongly to the north-east, with a velocity, as he thought, of two miles and a half an hour; which is greater, however, by one-half than the rate observed by captain Cook.

2. By the action of the south-westerly current, a vast quantity of ice is annually brought from the north and east, and conducted along the east shore of Old Greenland as far as Cape Farewell, where such masses as still remain undissolved are soon destroyed by the influence of the solar heat and the force of the sea, to which they then become exposed from almost every quarter. This ice being entirely free from salt, and very compact, appears originally

to have consisted of field-ice, a kind which perhaps requires the action of frost for many years to bring it to the thickness which it assumes. The quantity of heavy ice, in surface, which is thus annually dissolved, may, at a rough calculation, be stated to be about twenty thousand square leagues, while the quantity annually generated in the regions accessible to the whale-fishers is, probably, not more than one-fourth of that area. As such, the ice, which is so inexhaustible, must require an immense surface of sea for its generation, perhaps the whole or greater part of the so-called "Polar Basin;" the supply required for replacing what is dissolved in Behring's Strait, where the current sets towards the north, being, probably, of small moment. The current, in opposite parts of the northern hemisphere, being thus found to follow the same line of direction, indicates a communication between the two across the Poles; and the inexhaustible supply of ice, affording about fifteen thousand square leagues, to be annually dissolved above the quantity generated in the known parts of the Spitzbergen seas, supports the same conclusion.

3. The origin of the considerable quantity of drift-wood, found in almost every part of the Greenland sea, is traced to some country beyond the Pole, and may be brought forward in aid of the opinion of the existence of a sea communication between the Atlantic and the Pacific; which argument receives additional

strength from the circumstance of some of the drift-wood being worm-eaten. This last fact I first observed on the shores of the island of Jan Mayen, in August, 1817, and confirmed it by more particular observation when at Spitzbergen the year following. Having no axe with me when I observed the worm-eaten wood, and having no means of bringing it away, I could not ascertain whether the holes observed in the timber were the work of a *ptinus* or a *pholas*. In either case, however, as it is not known that these animals ever pierce wood in arctic countries, it is presumed that the worm-eaten drift-wood is derived from a transpolar region. Numerous facts of this nature might be adduced, all of which support the same conclusion.

4. The northern faces of the continents of Europe and Asia, as well as of that of America, so far as yet known, are such as renders it difficult even to imagine such a position for the unascertained regions, as to cut off the communication between the Frozen Sea, near the meridian of London, and that in the opposite part of the northern hemisphere, near Behring's Strait.

5. Whales, which have been harpooned in the Greenland seas, have been found in the Pacific Ocean; and whales, with stone lances sticking in their fat, (a kind of weapon used by no nation now known,) have been caught both in the sea of Spitzbergen and in Davis's Strait.

This fact, which is sufficiently authenticated, seems to me the most satisfactory argument.

The Russians, it appears, have, at intervals, discovered all the navigation between Archangel and the Strait of Behring, excepting a portion of about two hundred miles, occupied by the eastern part of a noss, or promontory, lying between the rivers Khatanga and Piacina. The northern extremity of this noss, called Cape Ceverovostochnoi, appears to have been doubled by lieutenant Prontschitscheff, in the year 1735, so that ice, and perhaps some small islands, seem in this place to form the great obstruction to the navigation. As far as can be well substantiated, the portion of the route between Archangel and Kamtchatka, which has been hitherto accomplished, clearly proves that, if a sea communication between the Atlantic and Pacific by the north-east really exists, it could never be practicable in one year. Inasmuch as the Russians were five or six years in performing so much of the navigation as has been accomplished, though they employed a number of different vessels in the undertaking, it is probable that the voyage could never be performed in one vessel, unless by mere accident, in less than eight or ten years. It is clear, therefore, that the discovery of a "north-east passage" could never be of any advantage to our commerce with China or India.

Though, however, the voyages undertaken in search of a north-east passage by the different nations of Europe have amounted to about twelve, besides numerous partial attempts by the Russians, and though all of them have failed in their principal intention, yet they have not been wholly lost to us; the Spitzbergen whale and seal fisheries, so valuable to the country, with the trade to Archangel, having arisen out of them.

The voyages of Davis, in the years 1585–6 and 1587–8, of Hudson, in 1610, and of Baffin, in 1616, were the source of the greatest part of the discoveries which have been made in the countries situated to the northward and westward of the south point of Greenland. To these regions, consisting of what have been called bays and straits, the names of these celebrated voyagers have been applied. All the voyages, indeed, since undertaken for discovery in the same quarter, amounting to nearly thirty, have done little more than confirm the researches of these three individuals, and show how little there was to be found, instead of discovering anything of moment. The ostensible object of most of these voyages, was the discovery of a shorter passage to India than that by the Cape of Good Hope, by the north-west. The existence of such a passage is not yet either proved or refuted. In an account of "a Voyage to Hudson's Bay," by Henry Ellis, such a passage is inferred to exist from the following considerations:—the want of trees on the west side of Hudson's Bay beyond a certain latitude; the appearance of a certain ridge of mountains lying near the same coast, and extending in a direction parallel to it; the direct testimony of the Indians, that they have seen the sea beyond the mountains, and have observed vessels navigating therein; and, most particularly, the nature and peculiarities observed in the tides. This latter argument is by far the most conclusive. From observations on the winds and tides in the Baltic, Mediterranean, and other inland seas, Ellis proceeds to show, that every circumstance with regard to the tides in Hudson's Bay is different from what would take place in an inland sea, and then concludes that Hudson's Bay is not such a sea, but has some opening which communicates with the Frozen Ocean on the north-west.

Other arguments, which have been offered in favour of the separation of Greenland from America, are deduced from the existence of a current setting from the north—from the circumstance of icebergs and drift-wood being brought down by the current—from whales wounded in the Spitzbergen seas having been caught in Davis's Strait—from the position of the land, as represented on skins by the native American Indians—and from the occurrence of certain plants in Greenland, which are natives of Europe, but have never been found in any part of the American continent.

The opinion appears to be quite incorrect, that if a passage were discovered, it would, probably, be open above half the year. I imagine it would be only at intervals of years that it would be open at all, and then, perhaps, for no longer time than eight or ten weeks in a season. Hence, as affording a navigation to the Pacific Ocean, the discovery of a north-west passage would be of no service. For many reasons, however, the examination of these interesting countries is an object worthy of the attention of a great nation. The advantages that have already arisen to Britain from the voyages undertaken in search of a north-west passage are, the establishment of the Davis's Strait's whale fishery, and of the trade of the Hudson's Bay company, so that the expenditure has not altogether been lost.

The adventurous spirit manifested by our early navigators, in performing such hazardous voyages in small barks, in which we should be scrupulous of trusting ourselves across the German Ocean, is calculated to strike us with surprise and admiration, while the correctness of their investigations gives us a high opinion of their perseverance and talent. The famous voyage of Baffin, in which the bay bearing his name was discovered, was performed in a vessel of only fifty-five tons' burden; that of Hudson, in which also the bay called by his name was first navigated, in the very same vessel; and the voyages of Davis chiefly in vessels of fifty, thirty-five, and ten tons' burden.

In perusing the voyages of our old navigators, it is particularly gratifying to those who consider religion as the chief business of this life, to observe the strain of piety and dependence upon Divine Providence which runs through almost every narrative. Their honest and laudable acknowledgments of a particular interference of the Almighty, working out deliverance for them in times of difficulty and danger, and their frequent declarations expressive of their reliance upon Providence, for assistance and protection in their adventurous undertakings, are worthy of our imitation. Thus, while our modern voyagers are much in the habit of attributing their most remarkable deliverances to "luck," "chance," and "fortune," those of old evidenced certainly a more Christian-like feeling, under such circumstances, by referring their deliverances to that great Being, from whom alone every good thing must be derived. They only who have a similar dependence on Providence, and who have been occasionally in trying situations, can duly appreciate the confidence and comfort which this belief is calculated to afford under the most appalling circumstances.

The class of vessels best adapted for discovery in the Polar seas, seems to be that of one hundred to two hundred tons' burden. They are stronger, more easily managed, in less danger of being stoved or crushed by ice, and not so expensive as those of larger dimensions. An increase of size is a diminution of comparative strength ; and hence it is evident, that a vessel intended for discovery should be just large enough for conveying the requisite stores and provisions, and for affording comfortable accommodation to the navigators, but no larger. Perhaps a vessel about one hundred and fifty tons' burden would be fully sufficient to answer every purpose. The navigation of the Polar seas, which is peculiar, requires in a particular manner an extensive knowledge of the nature, properties, and usual motions of the ice, and it can only be performed to the best advantage by those who have had long experience in working a ship in icy situations. It might be a material assistance to those employed in completing the examination of Baffin's Bay, as well as productive of some interesting information in meteorological phenomena, were a vessel or two to remain in the northern part of this bay through the winter. There is very little doubt that the vessel would, by this method, be released by the ice as early as May or June, and thus be afforded about double the time of research that could be obtained by wintering out of the bay. There would not, I imagine, be any very great danger in making this experiment, provided a sufficient quantity of fresh provisions, for the prevention of the scurvy among the crew, were taken out, and certain precautions adopted for the preservation of the ships. The ingenious apparatus invented by Mr. Thomas Morton designed to supersede, in repairing vessels, the necessity of dry docks, might be eminently advantageous.

In seas perpetually encumbered with ice, and probably crowded with islands, if not divided by necks of land, the chance of great discoveries and of extensive navigations towards the north-west, even under the best arrangements and under the boldest seamen, is but small. The most certain method of ascertaining the existence of a communication between the Atlantic and Pacific, along the northern face of America, would doubtless be by journeys on land. Men there are who, being long used to travel upon snow in the service of the Hudson's Bay company, would readily undertake the journey by the interior lakes of North America to the Frozen Ocean, or, in case of a continuity of land being found, to the very Pole itself, of whose success we should certainly have a reasonable ground of hope. The practicability of this mode of making discoveries has been fully proved by the expeditions of Mackenzie and Hearne ; and a possibility of performing very long journeys on snow can be attested, from personal experience, by those who have wintered a few times in Hudson's Bay.

The plan of performing a journey in this way, for discovering the northern termination of the American continent, and for tracing it round to its junction with the coasts of the same country, washed by the Atlantic, might be in some measure as follows. The party intended for this expedition, which should consist of as few individuals as possible, ought, perhaps, in the course of one summer, to make their way to one of the interior settlements of the Hudson's Bay company, or of the Canadian traders, such as Slave Fort, on the great Slave Lake, situated in the 62nd degree of latitude, or Fort Chepewyan, near the Athapescow Lake, in latitude 58° 40′, from whence sir Alexander Mackenzie embarked on his voyage to the Frozen Ocean, and there abide during the first winter. Supposing the travellers to winter at Slave Fort, they might calculate on being within the distance of two hundred leagues, or thirty or forty days' journey, moderate travelling, of the Frozen Ocean. In the month of March or April, the party, consisting of two or three Europeans, one or two Esquimaux interpreters, and two or more Indian guides, provided with everything requisite for the undertaking, might set out towards the north. On the arrival of the travellers among the Esquimaux, their Indian guides, from fear of this nation, would probably desert them, but the presence of their Esquimaux interpreters would secure them a good reception. When once they should meet with this people, they would have a strong evidence of being near the sea, as it is well known the Esquimaux never retire far from the coast. On their arrival at the coast, it will be necessary to associate with the Esquimaux, to submit in some measure to their mode of living, and, to effect any considerable discovery, it might be requisite to spend a winter or two among them, in which case they might trace the line of the Frozen Ocean to such a length, that the place where it joins the western coast of Baffin's Bay, or Hudson's Bay, or the eastern side of Greenland, would be determined. Or, if it should be objectionable to winter among the Esquimaux, several expeditions might be sent out at the same time from different stations, and on different meridians. The expense of three or four such expeditions over land would probably be less than that of one expedition by sea.

The scheme suggested by Robert Thorne, of Bristol, of finding a passage to India across the North Pole, about the year 1527, appears to have been immediately attempted by an expedition, consisting of two ships, sent out by order of Henry VIII.; one of the ships, we are informed, was lost; of the nature of the success of the other we have but a very unsatisfactory account. After this voyage, Barentz, Heemskerke, and Ryp, attempted the transpolar navigation, in 1596; Hudson, in 1607; Jonas Poole, in 1610 and 1611; Baffin and Fotherby, in 1614; Fotherby, in 1615; Phipps, in 1773; and Buchan and Franklin, in 1818. The highest latitude attained by any of these navigators did not, it would appear, exceed 81°.

My father, in the ship Resolution, of Whitby, in the year 1806, with whom I then served as chief mate, sailed to a much higher latitude. Our latitude, on three occasions, in the month of May, as derived from observations taken with a sextant by myself and my father, was 80° 50′ 28″, 81° 1′ 53″, and 81° 12′ 42″; after which we sailed so far to the northward as made it about 81° 30′, which is one of the closest approximations to the Pole which I conceive has been well authenticated.

Whatever may be our opinion of the accounts brought forward by some parties to prove the occasional accessibility of the 83rd or 84th parallel of north latitude, of this we may be assured, that the opinion of an open sea round the Pole is altogether chimerical. It is urged, indeed, that the extraordinary power of the sun, about the summer solstice, is so far greater at the Pole than at the Equator, as to destroy all the ice generated in the winter season, and to render the temperature of the Pole warmer and more congenial to feeling than it is in some places lying nearer the Equator. So far, however, from the actual influence of the sun, though acknowledged at a certain season to be greater at the Pole than at the Equator, being above what it is calculated to be by the ordinary formulæ for temperature, it is found by experiment in latitude 78° to be greatly below it—how then can the temperature of the Pole be expected to be so very different? From the remarks in the ensuing pages, it will be shown that ice is annually formed during nine months of the year in the Spitzbergen sea, and that neither calm weather, nor the proximity of land, is essential for its formation. Can it, then, be supposed, that at the Pole, where the mean temperature is probably as low as 10°, the sea is not full of ice? If the masses of ice, which usually prevent the advance of navigators beyond the 82nd degree of north latitude, be extended in a continued series to the Pole, (of which, unless there be land in the way, there appears no doubt,) the expectation of reaching the Pole by sea is altogether vain. By land, however, I do not conceive the journey would be impracticable. It would not exceed one thousand two hundred miles, (six hundred miles each way,) and might be performed on sledges, drawn by dogs or reindeer, or even on foot. Foot travellers would require to draw the apparatus and provisions, necessary for the undertaking, on sledges by hand, and in this way, with good dispatch, the journey would occupy at least two months; but, with the assistance of dogs, it might, probably, be accomplished in a little less time. With favourable winds, great advantage might be derived from sails set upon the sledges, which sails, when the travellers were at rest, would serve for the erection of tents. Small vacancies in the ice would not prevent the journey, as the sledges might be adapted so as to answer the purpose of boats, nor would the usual unevenness of the ice, nor the depth or softness of the snow, be an insurmountable difficulty, as journeys of nearly equal length, and under similar inconveniences, have been accomplished.

Among many similar accounts, there is one related by Muller, in his "Voyages from Asia to America," of a Cossack having actually performed a journey of about eight hundred miles in a sledge, drawn by dogs, across a surface of ice lying to the northward of the Russian dominions, which sufficiently establishes the practicability of a journey across the ice to the Pole. Alexei Markoff, a Cossack, was sent to explore the Frozen Ocean, in the summer of the year 1714, by order of the Russian government, but finding the sea so crowded with ice that he was unable to make any progress in discovery, he formed the design of travelling in sledges, during the winter or spring of the year, over the ice, which might then be expected to be firm and compact. Accordingly, he prepared several of the country sledges, drawn by dogs, and accompanied by eight persons, he set out on the 10th of March from the mouth of the Jana, in latitude 70° 30′, and longitude about 138° east. He proceeded for seven days northward, as fast as his dogs could draw, which, under favourable circumstances, is eighty or one hundred versts a day, until his progress was impeded, about the 78th degree of latitude, by the ice elevated into prodigious mountains. This prevented his further advance; at the same time, falling short of provisions for his dogs, his return was effected with difficulty; several of his dogs died for want, and were given to the rest for their support. On the 3rd of April, he arrived at Ust-Jauskoe Simowie, the place from whence he started, after an absence of twenty-four days, during which time he appears to have travelled about eight hundred miles. The journey of Markoff was nearly equal in extent to the projected journey to the Pole, and there appears no very great reason why a person equally adventurous with Markoff, and better provided, might not in a similar manner reach the Pole.

The first considerable discovery which appears to have been made in or near the arctic circle, was the result of accident; one of the numerous Scandinavian depredators, who, in the ninth century, cruised the northern seas in search of plunder, having been driven, by a long-continued storm, from the eastward upon the coast of Iceland, in the year 861. This island, from the quantity of snow seen on the mountains, was, by its discoverer Naddodd, at first called *Schnee*, or *Snowland*. It was visited by a Swede of the name of Gardar Suaffarson, three years after its discovery, and afterwards by another Swede, Flocke, from whom it received the name of *Iceland.* It was again visited in the year 874, by Ingolf and Lief, two Norwegians, and became the seat of a Norwegian colony.

The coast of Norway, to the entrance of the White Sea, was examined about this period by a person of the name of Ohthere, a Norwegian, who himself gave an account of his voyage to Alfred the Great, by whom it has been handed down to us along with the translation of the Ormesta of Orosius.

About the middle, or towards the end of the tenth century, an extensive country, to the westward of Iceland, was discovered by one of the colonists of the name of Gunbiorn, which country was visited, in the year 982, by one Eric Rauda, who had fled from Norway to Iceland, to avoid the punishment due to the crime of murder and various other offences. To this country he gave the name of *Greenland*, and in consequence of his exaggerated account of its products and appearance, a respectable colony was founded. About the year 1001, one of the Iceland colonists, Biorn by name, was accidentally driven by a storm to the southward of Greenland, where he discovered a new country, covered with wood. Lief, the son of Eric Rauda, fitted out a vessel, and visited the country. Grapes were discovered in it, and from this circumstance it was called *Vinland;* the day was eight hours long in winter, whence it appears that it must have been somewhere on the coast of North America, probably on the shore of Newfoundland.

The Christian religion was introduced into Iceland and Greenland about the year 1000, and within a hundred years afterwards generally diffused. Above sixteen churches were then built, and two convents. These buildings, as well as the habitations of the colonists, were erected near the southern point of Greenland. They had two settlements, the most western of which increased up to four parishes, containing one hundred farms or villages; and the most eastern, to twelve parishes, one hundred and ninety villages, one bishop's see, and two convents. The intercourse between Greenland and the rest of the world was intercepted about the year 1406, when the seventeenth bishop attempted to reach his see, but was prevented by ice. Since the beginning of the fifteenth century, these unfortunate colonists have been of necessity left to themselves, and not having been heard of, are supposed to have perished; but whether they were destroyed by their enemies the Esquimaux, or perished for want of their usual supplies, or were carried off by a destructive pestilence, as some have imagined, is still matter of doubt. Various attempts have been made by order of the Danish government for recovery of this country, and to ascertain the fate of these colonists, but hitherto without success.

After the voyages of Columbus, a new stimulus was offered to the enterprising trader, and to those who might be desirous of prosecuting the task of discovery, and a Portuguese navigator, John Vaz Costa Cortereal, about the year 1463 or 1464, tried the passage to India by the west, on a parallel far to the northward of that pursued by Columbus. In this voyage the land of Newfoundland appears to have been seen. The same voyage was attempted by Sebastian Cabot, a Venetian, in the year 1497, and by Gaspar Cortereal and Michael Cortereal, sons of the previously named Costa. Both these brothers perished, and a third brother, who would have followed in search of them, was prohibited from embarking by the king of Portugal.

An important voyage of discovery was that of sir Hugh Willoughby, in the year 1553, in which the coast now called Nova Zembla was discovered, and the Russian territory on the east side of the White Sea. In consequence of this expedition, a regular trade was established with Russia, which was accomplished under various privileges. In the year 1556, further discoveries in the same quarter were made by Stephen Burrough. Then followed the voyages of Martin Frobisher and John Davis ; the latter in the year 1585. He proceeded along the west side of Greenland, and then crossing an open sea to the north-westward, discovered land in latitude 66° 40′, giving names to the different parts of the coast which has since been denominated *Cumberland Island.* In the course of this voyage, they met with a multitude of natives, whom they found a very tractable people, and liberal in their mode of trafficking. In the following year, Davis prosecuted another voyage, but with no discovery of any consequence; and again also, for the third time, in the year following.

Amongst several expeditions sent out by the Dutch, to explore a passage to India and China by the north-east, that of two ships, under the pilotage of William Barentz, is the most memorable. It sailed from Amsterdam the 10th of May, 1596. After having discovered Spitzbergen, the two ships pursued different courses, and Barentz, while endeavouring to sail round Nova Zembla, became entangled in the ice. They were, in consequence, compelled to winter in this desolate and frozen country. "The journal of the proceedings of these poor people," as Mr. Barrow beautifully observes, "during this cold, comfortless, dark, and dreadful winter is intensely and painfully interesting. No murmuring escapes them in their hopeless and afflicted situation; but such a spirit of true piety, and a tone of such mild and subdued resignation to Divine Providence, breathe throughout the whole narrative, that it is impossible to peruse the simple tale of their sufferings, and contemplate their forlorn situation, without the deepest emotion." Forcibly, indeed, does their narrative illustrate the mind's independence of external comforts, and the peace and joy to be derived from trust in God, and cordial submission to his appointments. Part of the sufferers made their escape in two open boats from this dismal country, in the following summer, and after a perilous and painful voyage, of above one thousand one hundred miles, arrived in safety at Cola; but Barentz, with some others, was overcome by the severity of the climate, and the extraordinary exertions which he was obliged to make, and died.

In the year 1608, Henry Hudson was employed in search of a north-east passage; and, in 1610, in a voyage of discovery towards the north-west, in a vessel of fifty-five tons' burden. It was on this occasion that he discovered the bay which bears his name, hauled his ship on shore in a convenient situation, and wintered there. They fell short of provisions, and the following summer the crew mutinied, and abandoned their captain, his son, and others of the crew, to a most cruel fate. In 1616 was accomplished the remarkable voyage of William Baffin, attended by discoveries of a most extensive nature in the bay which bears his name, which, though regarded with considerable doubt at first, have since been abundantly confirmed by the labours of captain Ross and lieutenant Parry.

In March, 1822, the ship Baffin sailed from Liverpool, and reached 80° north latitude without experiencing any frost; on the 27th April, we arrived within ten miles of Spitzbergen, and were stopped in latitude 80° 30′ by main ice. Afterwards, we encountered a most heavy gale, the thermometer falling in the space of sixteen hours 34°, being the most remarkable change I ever experienced in Greenland seas. On the 1st May, we advanced to only five hundred and sixty-six miles' distance from the Pole, and subsequently discovered the eastern coast of Greenland, a continuation towards the north of the coast on which the ancient Icelandic colonies were planted. We surveyed and named various parts of this coast, to the extent of about eight hundred miles, and found traces of inhabitants. It was inferred that Greenland is probably a great group of islands. The expedition returned on the 18th September, in the same year.

CHAPTER II.

DESCRIPTIVE ACCOUNT OF SOME OF THE POLAR COUNTRIES.

Spitzbergen extends furthest towards the north of any country yet discovered. It is surrounded by the Arctic Ocean, or Greenland Sea; and, though the occasional resort of persons drawn thither for purposes of hunting and fishing, does not appear to have been ever inhabited. It lies between the latitudes 76° 30′ and 80° 7′ north, and between the longitude of 9°, and, perhaps, 22° east; but some of the neighbouring islands extend at least as far north as 80° 40′, and still further towards the east than the mainland of Spitzbergen. The western part of this country was discovered by Barentz, Heemskerke, and Ryp, in two vessels, fitted out of Amsterdam, on the 19th of June, 1596, who, from the numerous peaks and acute mountains observed on the coast, gave it the appropriate name of Spitzbergen, signifying "sharp mountains." It was afterwards named *Newland*, or *King James's Newland*, and then *Greenland*, being supposed to be a continuation towards the east of the country so called by the Icelanders. It was re-discovered by Henry Hudson, an English navigator, in 1607, and four years afterwards became the resort of the English for the purpose of taking whales, since which period its shores have annually been visited by one or other of the nations of Europe, with the same object, to the present time. And though the soil of the whole of this remote country does not produce vegetables suitable or sufficient for the nourishment of a single human being, yet its coasts and adjacent seas have afforded riches and independence to thousands.

This country exhibits many interesting views, with numerous examples of the sublime. Its stupendous hills, rising by steep acclivities from the very margin of the ocean to an immense height; its surface, contrasting the native, protruding, dark-coloured rocks, with the burden of purest snow and magnificent ices, altogether constitute an extraordinary and beautiful picture.

The whole of the western coast is mountainous and picturesque, and though it is shone upon by a four months' sun every year, its snowy covering is never wholly dissolved, nor are its icy monuments of the dominion of frost ever removed. The valleys, opening towards the coast, and terminating in the background with a transverse chain of mountains, are chiefly filled with everlasting ice. The inland valleys, at all seasons, present a smooth and continued bed of snow, in some places divided by considerable rivulets, but in others exhibiting a pure unbroken surface for many leagues in extent. Along the western coast, the mountains take their rise from within a league of the sea, and some from its very edge. Few tracts of table-land, of more than a league in breadth, are to be seen, and in many places the blunt termination of mountain ridges project beyond the regular line of the coast, and overhang the waters of the ocean. The southern part of Spitzbergen consists of groups of insulated mountains, little disposed in chains, or in any determinate order, having conical, pyramidal, or ridged summits, sometimes round-backed, frequently terminating in points, and occasionally in acute peaks, not unlike spires. An arm of a short mountain chain, however, forms the southern cape, or Point Look-out, but a low flat, in the form of a fish's tail, of about forty square miles in surface, constitutes the termination of the coast. Other promontories, lying nearly north and south, are of a similar nature.

To the northward of Charles's Island the mountains are more dispersed in chains than they are to the southward. The principal ridge lies nearly north and south, and the principal valley extends from the head of Cross Bay to the northern face of the country, a distance of forty or fifty miles. An inferior chain of hills, two or three leagues from the coast, runs parallel with the shore, from which lateral ridges project into the sea, and terminate in mural precipices. Between these lateral ridges, some of the largest icebergs on the coast occur. The most remarkable mountains I have seen are situated near Horn Sound, on Charles's Island, and near King's Bay. Horn Mount, or Hedge-hog Mount, so called from an appearance of spires on the top, when seen in some positions, takes its rise from a small tract of alpine land, on the southern side of Horn Sound. It has different summits, chiefly in the form of spires, one of which is remarkably elevated. I had an opportunity of determining its height in the year 1815. From one set of observations its altitude came out 1,457 yards, and from another 1,473 yards, the mean of which is 1,465 yards, or 4,395 feet. Another peak, a few miles further to the northward, appeared to be 3,306 feet high.

On Charles's Island is a curious peak, which juts into the sea. It is crooked, perfectly naked, being equally destitute of snow and verdure, and from its black appearance, or pointed figure, has been denominated the Devil's Thumb. Its height may be about 1,500 or 2,000 feet. The middle hook of the foreland, as the central part of the chain of mountains in Charles's Island is called, is a very interesting part of the coast. These mountains, which are, perhaps, the highest land adjoining the sea which is to be met with, take their rise at the water's edge, and, by a continued ascent of an angle at first of about 30°, and increasing to about 45°, or more, each comes to a point, with the elevation of about six-sevenths of an English mile. This portion of the chain exhibits five distinct summits, some of them to appearance are within half a league, horizontal distance, of the margin of the sea. The points formed by the top of two or three of them are so fine, that the imagination is at a loss to conceive of a place on which an adventurer, attempting the hazardous exploit of climbing one of the summits, might rest. Were such an undertaking practicable, it is evident it could not be effected without imminent danger. Besides extraordinary courage and strength requisite in the adventurer, such an attempt would need the utmost powers of exertion, as well as the most irresistible perseverance. Frederick Martens, in his excellent account of a "Voyage to Spitzbergen," undertaken in the year 1671, describes some of the cliffs as consisting of but one stone from the bottom to the top, and as smelling very sweet where covered with lichens. In Magdalen Bay, the rocks he describes as lying in a semicircular form, having at each extremity two high mountains, with natural excavations, "after the fashion of a breastwork," and, at their summits, points and cracks like battlements.

Some of the mountains of Spitzbergen are well-proportioned, four-sided pyramids, rising out of a base of a mile, or a mile and a half, to a league square; others form angular chains, resembling the roof of a house, which recede from the shore in parallel ridges, until they dwindle into obscurity in the distant perspective. Some exhibit the exact resemblance of art, but in a style of grandeur exceeding the famed pyramids of the east, or even the more wonderful tower of Babel. An instance of such a regular and magnificent work of nature is seen near the head of King's Bay, consisting of three piles of rocks, of a regular form, known by the name of the Three Crowns. They rest on the top of the ordinary mountains, each commencing with a square table, or horizontal stratum of rock, on the top of which is another of similar form and height, but of smaller area; this is continued by a third, a fourth, and so on, each succeeding stratum being less than the next below it, until it forms a pyramid of steps, almost as regular, to appearance, as if worked by art.

Many of the mountains of Spitzbergen are inaccessible. The steepness of the ascent, and the looseness of the rocks, with the numerous lodgments of ice in the cliffs, or on the sides of the cliffs, constitute in many places insurmountable obstacles. Some hills, indeed, may be climbed with tolerable safety, but generally the attempt is hazardous. Many have fallen and lost their lives, especially in the descent. When Barentz and Heemskerke discovered Cherie Island, on their advance towards the north, they also discovered Spitzbergen, when some daring fellows among their sailors, who had been collecting birds' eggs, climbed a high, steep mountain, resembling those of Spitzbergen, and unexpectedly found themselves in a most perilous situation, for, on turning to descend, the way by which they had advanced presented a dismal assemblage of pointed rocks, perpendicular precipices, and yawning chasms. The view of the danger of the ascent struck them with terror. No relief, however, could be afforded them, and they were bewildered among the rocks. At length, after a most anxious and painful exercise, in which they found it necessary to slide down the rocks, while lying flat on their bodies, they reached the foot of the cliff in safety. Barentz, who had observed their conduct from the shore, gave them a sharp reproof for their temerity.

One of the most interesting appearances to be found in Spitzbergen, is the iceberg. These mountains of ice occur in the valleys adjoining the coast of Spitzbergen, and other Polar countries. A little to the northward of Charles's Island are the *Seven Icebergs*. Each of these occupies a deep valley, opening towards the sea, formed by hills of about two thousand feet elevation on the sides, and terminated in the interior by the chain of mountains, of perhaps three thousand to three thousand three hundred feet in height, which follows the line of the coast. They are exactly of the nature and appearance of glaciers, and there are many others of various sizes along the shores of this remarkable country.

It is not easy to form an adequate conception of these truly wonderful productions of nature. Their magnitude, their beauty, and the contrast they form with the gloomy rocks around, produce sensations of lively interest. Their upper surfaces are generally concave ; the higher parts are always covered with snow, and have a beautiful appearance, but the lower parts, in the latter end of every summer, present a bare surface of ice. The front of each, which varies in height from the level of the ocean to four hundred or five hundred feet above it, lies parallel with the shore, and is generally washed by the sea. This part, resting on the strand, is undermined to such an extent by the sea, when any way turbulent, that immense masses, loosened by the freezing of water, lodged in the recesses in winter, or by the effect of streams of water running over its surface and through its chasms in summer, break asunder, and, with a thundering noise, fall into the sea.

On an excursion to one of the Seven Icebergs, in July, 1818, I was particularly successful in witnessing one of the grandest effects which these Polar glaciers ever present. A strong north-westerly swell having, for some hours, been beating on the shore, had loosened a number of fragments attached to the iceberg, and various heaps of broken ice denoted recent shoots of the seaward edge. As we rode towards it, with a view of proceeding close to its base, I observed a few little pieces fall from the top, and, while my eye was fixed on the place, an immense column, probably fifty feet square, and one hundred and fifty feet high, began to leave the parent ice at the top, and leaning majestically forward with an accelerated velocity, fell with an awful crash into the sea. The water into which it plunged was converted into an appearance of vapour, or smoke, like that from a furious cannonading. The noise was equal to that of thunder, which it nearly resembled. The column which fell was nearly square, and in magnitude resembled a church. It broke into thousands of pieces. This circumstance was a happy caution, for we might inadvertently have gone to the base of the icy cliff, from whence masses of considerable magnitude were continually breaking.

This iceberg was full of rents as high as any of our people ascended upon it, extending in a direction perpendicularly downward, and dividing it into innumerable columns. The surface was very uneven, being furrowed and cracked all over. This roughness appeared to be occasioned by the melting of the snow, some streams of water being seen running over the surface; and others, having worn away the superficial ice, could still be heard pursuing their course through subglacial channels to the front of the iceberg, where, in transparent streams, or in small cascades, they fell into the sea. In some places, chasms of several yards in width were seen, in others they were only a few inches or feet across. One of the sailors, who attempted to walk across the iceberg, imprudently stepped into a narrow chasm, filled up with snow to the general level. He instantly plunged up to his shoulders, and might, but for the sudden extension of his arms, have been buried in the gulf.

Icebergs are, probably, formed of more solid ice than glaciers, but, in every other respect, they are very similar. The ice of which they consist is, indeed, a little porous, but considerable pieces are found of perfect transparency. Being wholly produced from rain or snow, the water is necessarily potable. Icebergs have, probably, the same kind of origin as glaciers, and the time of their first stratum is nearly coeval with the land on which they are lodged. Though large portions may be frequently separated from the lower edge, or, by large avalanches from the mountain summit, be hurled into the sea, yet the annual growth replenishes the loss, and, probably, on the whole, produces a perpetual increase in thickness.

Spitzbergen and its islands, with some other countries within the Arctic Circle, exhibit a kind of scenery which is altogether novel. The principal objects which strike the eye are innumerable mountainous peaks, ridges, precipices, or needles, rising immediately out of the sea, to an elevation of three thousand or four thousand feet, the colour of which, at a moderate distance, appears to be blackish shades of brown, green, grey, and purple; snow or ice, in striæ, or patches, occupying the various clefts and hollows in the sides of the hills, capping some of the mountain summits, and filling with extended beds the most considerable valleys; and ice of the glacier-form occurring at intervals all along the coast in particular situations, as already described, in prodigious accumulations. The glistening, or vitreous appearance of the iceberg precipices, the purity, whiteness, and beauty of the sloping expanse, formed by the adjoining or intermixed mountains and rocks, perpetually "covered with a mourning veil of black lichens," with the sudden transitions into a robe of purest white, where patches or beds of snow occur, present a variety and extent of contrast altogether peculiar, which, when enlightened by the occasional ethereal brilliancy of the Polar sky, and harmonized in its serenity with the calmness of the ocean, constitute a picture both novel and magnificent. There is, indeed, a kind of majesty, not to be conveyed in words, in these extraordinary accumulations of snow and ice in the valleys, and in the rocks above rocks, and peaks above peaks, in the mountain groups, seen rising above the ordinary elevation of the clouds, and terminating occasionally in crests of everlasting snow, especially when you approach the shore under shelter of the impenetrable density of a summer fog, in which case the fog sometimes disperses like the drawing of a curtain, when the strong contrast of light and shade, brightened by a cloudless atmosphere and powerful sun, bursts on the senses in a brilliant exhibition. Here are to be beheld the glories of that one God, who is the Maker of all things in heaven and on earth, and who, unlike the false deities of heathen nations, is not confined in his presence and government to any particular zone of the earth's surface, but illustrates the skill and excellence of his creation, both in the beauties of icy and torrid climes.

A remarkable deception, in the apparent distance of the land, is to be attributed to the strong contrast of light and shade, and the great height and steepness of the mountains, displayed in these regions. Any strangers to the Arctic countries, however capable of judging of the distance of land generally, must be completely at a loss in their estimations when they approach within sight of Spitzbergen. When at the distance of twenty miles, it would be no difficult matter to induce even a judicious stranger to undertake a passage in a boat to the shore, from the belief that he was within a league of the land. At this distance, the portions of rock and patches of snow, as well as the contour of the different hills, are as distinctly marked as similar objects in many other countries, not having snow about them, would be at a fourth or a fifth part of the distance. Hence we can account, on a reasonable ground, for a curious circumstance related in a Danish voyage, undertaken for the recovery of the last colony in Greenland, by Mogens Heinson. This person, who passed for a renowned seaman in his day, was sent out by Frederick II., king of Denmark. After encountering many difficulties and dangers from storms and ice, he got sight of the east coast of Greenland, and attempted to reach it; but, though the sea was quite free from ice, and the wind favourable and blowing a fresh gale, he, after proceeding several hours without appearing to get any nearer the land, became alarmed, backed about, and returned to Denmark. On his arrival, he attributed this extraordinary circumstance—magnified, no doubt, by his fears—to his vessel having been stopped in its course by "some loadstone rocks hidden in the sea." The true cause, however, of what he took to be a submarine magnetic influence, arose, I doubt not, from the deceptive character of the land, as to distance, which I have mentioned.

Spitzbergen abounds with deep bays and extensive sounds, in many of which are excellent harbours. From Point Look-out to Hackluyt's Headland, the west coast forms almost a series of rocks and foul ground, few parts, excepting the bays, affording anchoring for ships. Some of these rocks are dry only at low water, or only show themselves when the sea is high, and are dangerous to shipping; others are constantly above water, or altogether so below the surface that they can either be seen and avoided, or sailed over in moderate weather without much hazard. On the east side of Point Look-out, a ridge of stony ground stretches five leagues into the sea, towards the south-east, on which the sea occasionally breaks.

Horn Sound affords tolerable anchorage; within Bell Sound are several anchoring places and some rivers, and in Ice Sound, at Green Harbour, is good anchorage near the bank, in ten to eight fathoms' water, or less. In several other places, when not encumbered with ice, there is pretty good refuge for ships. On the north and east sides of Spitzbergen are several harbours, some of them very safe and commodious, but they are not so often free from ice as those westward, and, therefore, have seldom been visited.

Though the whale-fishers in the present age generally see the level of Spitzbergen every voyage, yet not many of them visit the shores. My father has been several times on shore in different parts. My own landing, for the first time in an Arctic country, was on Charles's Island, or Fair Forehead, at the north-west point. The number of birds seen on the precipices and rocks adjoining the sea was immense, and the noise which they made on our approach was quite deafening. The weather was calm and clear when I went on shore, but suddenly, a thick fog and breeze of wind commencing, obliged us to put off with haste, and subjected us to great anxiety before we reached the ship.

In the summer of 1818, I was several times on shore on the main, and landed once in the same season on the north side of King's Bay. Being near the land, on the evening of the 23rd of July, the weather beautifully clear, and all our sails becalmed by the hills, excepting the top-gallant sails, in which we had constantly a gentle breeze, I left the ship in charge of an officer, with orders to stand no nearer than into thirty fathoms' water, and with two boats and fourteen men rowed to the shore. We arrived at the beach about half-past seven, P.M., and landed on a track of low flat ground, extending about six miles north and south, and two or three east and west. This table-land lies so low that it would be overflown by the sea, were it not for a natural embankment of shingle thrown up by the sea.

After advancing about half a furlong, we met with mica slate, in nearly perpendicular strata; and a little further on with an extensive bed of limestone, in small angular fragments. Here and there we saw large ponds of fresh water, derived from melted ice and snow; in some places, small remains of snow; and lastly, near the base of the mountains, a considerable morass, into which we sank nearly to the knees. Some unhealthy-looking mosses appeared on this swamp, but the softest part, as well as most of the ground we had hitherto traversed, was entirely void of vegetation. This swamp had a moorish look, and consisted, apparently, of black alluvial soil, mixed with some vegetable remains, and was curiously marked on the surface with small polygonal ridges, from one to three yards in diameter, so combined as to give the ground an appearance such as that exhibited by a section of honeycomb. An ascent of a few yards from the morass, of somewhat firmer ground, brought us to the foot of the mountain, to the northward of the Mitre Cape. Here some pretty specimens of *Saxifraga oppositifolia* and *Greenlandica*, *Salix herbacea*, *Draba alpina*, *Papaver alpina*, (of Mr. Don,) etc., and some other plants in full flower, were found on little tufts of soil, and scattered about on the ascent. The first hill rose at an inclination of 45°, to the height of about fifteen hundred feet, and was joined on the north side to another of about twice the elevation. We began to climb the acclivity on the most accessible side, at about 10, P.M.; but, from the looseness of the stones, and the steepness of the ascent, we found it a most difficult undertaking. There was scarcely a possibility of advancing by the common movement of walking in this attempt; for the ground gave way at every step, and no progress was made; hence, the only method of succeeding was by the effort of leaping or running, which, under the peculiar circumstances, could not be accomplished without excessive fatigue. In the direction we traversed, we met with angular fragments of limestone and quartz, chiefly of one or two pounds' weight, and a few naked rocks protruding through the loose materials, of which the side of the mountain, to the extent it was visible, was principally composed. These rocks appeared solid at a little distance, but, on examination, were found to be full of fractures in every direction, so that it was with difficulty that a specimen of five or six pounds' weight, in a solid mass, could be obtained. Along the side of the first range of hills, near the summit, was extended a band of ice and snow, which, in the direct ascent, we tried in vain to surmount. By great exertion, however, in tracing the side of the hill for about two hundred yards, where it was so uncommonly steep that at every step showers of stones were precipitated to the bottom, we found a sort of angle of the hill, free from ice, by which the summit was scaled.

Here we rested until I took a few angles and bearings of the most prominent parts of the coast, when, having collected specimens of the minerals, and such few plants as the barren ridge afforded, we proceeded on our excursion. In our way to the principal mountain near us, we passed along a ridge of the secondary mountains, which was so acute that I sat across it with a leg on each side as on horseback. To the very top it consisted of loose sharp limestones, of a yellowish or reddish colour, smaller in size than the stones generally used for repairing high roads, few pieces being above a pound in weight. The fracture appeared rather fresh. After passing along this ridge about three or four furlongs, and crossing a lodgment of ice and snow, we descended by a sort of ravine to the side of the principal mountain, which arose with a uniformly steep ascent, similar to that we had already surmounted, to the very summit. The ascent was now even more difficult than before; we could make no considerable progress, but by the exertion of leaping and running, so that we were obliged to rest after every fifty or sixty paces. No solid rock was met with, and no earth or soil. The stones, however, were larger, appeared more decayed, and were more uniformly covered with black lichens; but several plants of the *Saxifraga*, *Salix*, *Draba*, *Cochlearia*, and *Juncus genera*, which had been met with here and there for the first two thousand feet of elevation, began to disappear as we approached the summit. The invariably broken state of the rocks appeared to have been the effect of frost. On calcareous rocks, some of which are not impervious to moisture, the effect is such as might be expected; but how frost can operate in this way on quartz is not so easily understood.

As we completed the arduous ascent, the sun had just reached the meridian below the Pole, and still shed his reviving rays of unimpaired brilliancy on a small surface of snow, which capped the mountain summit. A thermometer, placed among stones in the shade of the brow of the hill, indicated a temperature as high as 37°. At the top of the first hill, the temperature was 42°; and at the foot, on the plain, 44° to 46°; so that, at the very peak of the mountain, estimated at three thousand feet elevation, the power of the sun at midnight produced a temperature several degrees above the freezing point, and occasioned the discharge of streams of water from the snow-capped summit. In Spitzbergen, the frost relaxes in the months of July and August, and the thawing temperature prevails for considerable intervals on the greatest heights that have been visited.

As the capacity of air for heat increases as its density decreases, and that in such a degree that about every ninety yards of elevation in the lower atmosphere produces a depression of one degree of temperature of Fahrenheit, we find that the elevation of some of the Alps, Pyrenees, and mountains of Nepaul in the temperate zone, is such, that their summits are above the level where a temperature of thawing can at any time prevail; and though, by the application of this principle to the mountains of Spitzbergen, we find that a thawing temperature may be occasionally expected, yet we do not see how the prevalence of a thaw should be so continual as to disperse the winter's coat of snow, where the mean temperature of the hottest month in the year must, on a mountain fifteen hundred feet elevation or upward, probably be below the freezing point. Perhaps the difficulty is to be thus resolved. The weather, in the months of June, July, and August, is much clearer at Spitzbergen than it is near the neighbouring ice, where most of my observations on temperature were made, and as such the temperature of these months on shore must be warmer than at sea, and so much higher indeed as is requisite for occasioning the dissolution of snow even on the tops of the mountains.

The highest temperature I ever observed in Spitzbergen was 48°; but in the summer of 1773, when captain Phipps visited Spitzbergen, a temperature of $58\frac{1}{2}$° once occurred. Supposing this to be the greatest degree of height which takes place, it will require an elevation of 7,791 feet for reducing that temperature to the freezing point, and hence we may reckon this to be about the altitude of the upper line of congelation, where frost perpetually prevails.

The prospect from the mountain which we ascended was most extensive and grand. A fine sheltered bay was seen on the east of us, an arm of the same on the north-east, and the sea, whose glassy surface was unruffled by the breeze, formed an immense expanse on the west; the icebergs, rearing their proud crests almost to the tops of the mountains between which they were lodged, and defying the power of the solar beams, were scattered in various directions about the sea-coast, and in the adjoining bays. Beds of snow and ice, filling extensive hollows, and giving an enamelled coat to adjoining valleys, one of which, commencing at the foot of the mountain where we stood, extended in a continued line across the north, as far as the eye could reach; mountain rising above mountain, until by distance they dwindled into insignificance; the whole contrasted by a cloudless canopy of deepest azure, and enlightened by the rays of a blazing sun, and the effect aided by a feeling of danger, seated as we were on the pinnacle of a rock, almost surrounded by tremendous precipices; all united to constitute a picture singularly sublime.

A gentle breeze of wind, that prevailed on the summit, much refreshed us, and strengthened us for the descent, which, though we had regarded it with indifference, we found really a very hazardous, and, in some instances, a painful undertaking. On the flat of land next the sea, we met with the horns of reindeer, many skulls and other bones of sea-horses, whales, narwhales, foxes, and seals, and some human skeletons, laid in chest-like coffins, exposed naked on the strand. Two Russian lodges formed of logs of pine, with a third in ruins, were also seen;

the former, from a quantity of fresh chips about them, and other appearances, gave evidence of having been recently inhabited. These huts were built upon a ridge of shingle, adjoining the sea. Among the shingle on the beach were numbers of nests, containing the eggs of terns, ducks, and burgomasters, and in some of them were young birds. One of the latter, which we took on board, was very lively, and grew rapidly, but having taken a fancy to a cake of white lead, with which the surgeon was finishing a drawing, he was poisoned. The only insect I saw was a small green fly, which swarmed upon the shingle about the beach. The sea along the coast teemed with a species of *helix*, with the *clio borealis*, and with small shrimps. No animal of the class *Vermes*, and no living quadruped, was observed. Drift-wood was in some abundance, and, owing to the prevalence of a strong west wind, the shore was covered in many places with deep beds of sea-weed.

Of all the objects, however, that we met with in the course of our research, none excited so much interest as the carcase of a dead whale, found stranded on the beach, which, though much swollen, and not a little putrid, fixed our attention, and diverted us from objects of mere curiosity. It proved a prize to us of the value of about £400, but was not secured without much labour. From a harpoon found in its body, it appeared to have been struck by some of the fishers on the Elbe, and having escaped from them, it had probably stranded itself where we found it.

The climate of Spitzbergen is no doubt more disagreeable to human feeling than that of any other country yet discovered. Extending to within ten degrees of the Pole, it is generally intensely cold, and even in the three warmest months, the temperature not averaging more than $34\frac{1}{2}°$, it is then subject to a cold of three, four, or more degrees below the freezing point. It has the advantage, however, of being visited by the sun for an uninterrupted period of four months in each year, thus having a summer's day—if so long an interval between the rising and setting of the sun may be so denominated—consisting of one-third part of the year. But its winter is proportionably desolate ; the sun, in the northern parts of the country, remaining perpetually below the horizon from about the 22nd of October to about the 22nd of February. This great winter night, though sufficiently dreary, is by no means so dark as might be expected, God having, by wise and merciful arrangements, distributed, with some approach to equality, the blessings of his providence. The sun, even during its greatest south declination, approaches within $13\frac{1}{2}°$ of the horizon, and affords a faint twilight for about one-fourth part of every twenty-four hours. Added to this twilight, the aurora borealis, which sometimes exhibits a brilliancy approaching a blaze of fire—the stars, which shine with an uncommon degree of brightness—and the moon, which, in north declination, appears for twelve or fourteen days together without setting—altogether have an effect, which, when heightened by the reflection of a constant surface of snow, generally give sufficient light for going abroad; but, with the light afforded by the heavens, when the moon is below the horizon, it is seldom possible to read.

The first human beings who are known to have passed the winter in Spitzbergen, were two parties of seamen, belonging to English whalers, who were left on shore by accident, on two different occasions; the first party, consisting of nine persons, all perished; but the latter, composed of eight individuals, survived the rigours of the winter of 1630-1, and were all rescued. In the year 1633, seven volunteers, belonging to the Dutch fleet, were induced, by certain emoluments, to attempt the same enterprise, and succeeded in passing the winter without sustaining any injury; but, on the same hazardous experiment being tried by seven other persons the following winter, they all fell a sacrifice to the ravages of the scurvy. Some Russians seem to have been the next to attempt this adventurous exploit, who, from being inured to a winter little less severe at home, were enabled to accomplish it with more safety. Four men, who landed on an island on the east side of Spitzbergen, in the year 1743, and were deprived of the means of getting away by an unexpected calamity having overtaken the vessel to which they belonged, remained there some years. Being exposed to uncommon privations, they were led by their necessities to adopt some most ingenious devices for providing themselves with food and raiment in their long and severe banishment. One of their number died; but the others were relieved, after a stay of three years and six months, by a vessel providentially driven on the coast, and restored to their friends, enriched with skins and other produce of the country in which they had been exiled.

In modern times, people of the same nation have been in the habit of submitting to a voluntary transportation, with the object of making some considerable advantage by the opportunities which such a measure affords them of hunting and fishing. These persons were formerly employed in the service of the "White Sea Fishing Company;" but this company being now no longer in existence, the trade is conducted by private adventurers. They now proceed from Megen, Archangel, Onega, Rala, and other places bordering the White Sea, in vessels of sixty to one hundred and sixty tons, some intended for the summer fishing, and others for the winter. The former put to sea in the beginning of June, and sometimes return in September; the latter sail about a month later, and wintering in the most secure coves of Devil Bay, Bell Sound, Horn Sound, Cross Bay, Magdalena Bay, Love

Bay, and others, return home in the months of August or September of the following year. The fishermen reside on shore during the winter, in huts of the same kind as those used by the peasants in Russia, which, being taken out with them in pieces, are constructed with but little trouble, in the most convenient situations. They build their stoves with bricks, or with clay, found in the country. Their largest hut, which is erected near the place where their vessels or boats are laid up, is from twenty to twenty-five feet square, and is used as a station and magazine; but the huts used by the men who go in quest of skins, which are erected along shore, are only seven or eight feet square. The smaller huts are usually occupied by two or three men, who take care to provide themselves from the store with the necessary provisions for serving them the whole winter.

I have visited several of these huts, some constructed of logs, others of deals, two inches in thickness. During the stay of the hunters, they employ themselves in killing seals, sea-horses, etc., in the water; and bears, foxes, deer, or whatever else they meet with, on land. They are furnished with provisions for eighteen months by their employers, consisting of rye-flour for bread, oatmeal, barley-meal, peas, salt beef, salt cod, and salt halibut, together with curdled milk, honey, and linseed oil; besides which, they procure for themselves *lion*-deer in winter, and birds in summer. Their drink chiefly consists of a liquor called *nuas*, made from rye-flour and water; malt or spirituous liquors being entirely forbidden, to prevent drunkenness, as these persons, when they were allowed it, drank so immoderately, that their work was often altogether neglected. For general purposes, they use spring water when it is to be had, or, in lieu of it, take water from lakes; but, when neither can be got, they use melted snow. Their fuel, for the most part, is brought with them from Russia, and drift-wood is used for the same purpose. The hunters defend themselves from the rigour of the frost by a covering made of skin, over which they wear a garment called *kushy*, made of the skin of rein-deer, with boots of the same. A warm cap, called a *truccky*, defends the whole head and neck, and part of the face; and gloves of sheep-skin, the hands. They seldom travel far in winter, but the short excursions they have occasion to make they perform on foot, on snow-skates, and draw their food after them on hand-sledges, but such as have dogs employ them in this service. Their huts, in stormy weather, are often buried in the snow, and in such cases they are obliged to make their way through the chimney to get out. As an anti-scorbutic, they make use of a herb produced in the country, a stock of which they generally provide themselves with on the approach of winter, but sometimes they are under the necessity of digging through the snow to obtain it. They either eat it without any preparation, or drink the liquor prepared from it by infusion in water. For the same purpose, they use a kind of raspberry, and a decoction of fir-tops.

Spitzbergen does not afford many vegetables. It may be remarked, that vegetation goes on uncommonly quick in this country. Most of the plants spring up, flower, and afford seed in the course of a month or six weeks. They are chiefly of a dwarfish size. Some of the flowers are really pretty, but exhibit few colours, excepting yellow, white, and purple. The only plant I met with partaking of the nature of a tree, (a *salix*, allied to *S. herbacea*,) grows but to the height of three or four inches. Although Spitzbergen is probably rich in minerals, yet so partial has been the examination of it that nothing of any value, excepting marble and coal, has yet been met with. The remarks made concerning the appearances and productions of Spitzbergen apply in general to the islands adjacent. The principal of these are Moffen Island, Low Island, Hope Island, and Cherie Island. The last abounds in sea-horses, bears, foxes, and sea-fowl. Lead ore, in veins at the surface, has been found here, and specimens of virgin silver.

Between the latitudes of 70° 49′ and 71° 8′ 20″ north, and between the longitudes 7° 26′ and 8° 44′, lies the island of Jan Mayen, said to have been first seen by a Dutch navigator of this name in the year 1611. The west side, affording the greatest number of anchorages, having the best convenience for landing, and being better sheltered from the most frequent storms, was selected by the Dutch for their *boiling* stations. I was successful, in my passage homeward, in the year 1817, in effecting a landing. On approaching, the first object which strikes attention is the peak of Beerenberg, which I subsequently saw at a distance (by observation) of ninety-five to a hundred miles. It rears its icy summit to an elevation of 6,780 feet above the level of the sea. After leaving the sea-shore, fragments of lava were seen at every step, and numerous undoubted marks of recent volcanic action. On reaching a summit, estimated at 1,500 feet above the sea, we beheld a beautiful crater, forming a basin of 500 or 600 feet in depth, and 600 or 700 yards in diameter. The bottom of the crater was filled with alluvial matter to such a height that it presented a horizontal flat of an elliptical form, measuring 400 feet by 240. In the spring of the following year, some volcano was, I believe, in action in this neighbourhood, as I observed considerable jets of smoke discharged from the earth at intervals of every three or four minutes.

CHAPTER III.

AN ACCOUNT OF THE GREENLAND OR POLAR ICE.

Of the inanimate productions of the Polar Seas, none perhaps excite so much interest and astonishment in a stranger as the ice in its great abundance and variety. The stupendous masses known by the name of icelands or icebergs, common to Davis's Strait, and sometimes met with in the Spitzbergen Sea, from their height, various forms, and the depth of water in which they ground, are calculated to strike the beholder with wonder; yet the prodigious sheets of ice, called ice-fields, more peculiar to the Spitzbergen Sea, are not less astonishing. Their deficiency in elevation is sufficiently compensated by their amazing extent of surface. Some of them have been observed extending many leagues in length, and covering an area or several hundreds of square miles, each consisting of a single sheet of ice, having its surface raised in general four or six feet above the level of the water, and its base depressed to the depth of ten to twenty feet beneath.

The ice in general is designated by a variety of appellations, distinguishing it according to the size or shape of the pieces, their number or form of aggregation, thickness, transparency, situation, etc. As the different denominations of ice will be frequently referred to in the course of this work, it may be useful to give definitions of the terms in use among the whale-fishers for distinguishing them.

1. An *iceberg*, or ice-mountain, is a large insulated peak of floating ice, or a glacier, occupying a ravine or valley, generally opening towards the sea in an arctic country.

2. A *field* is a sheet of ice, so extensive that its limits cannot be discerned from the ship's mast-head.

3. A *floe* is similar to a field, but smaller, inasmuch as its extent *can* be seen. This term, however, is seldom applied to pieces of ice of less diameter than half-a-mile or a mile.

4. *Drift-ice* consists of pieces less than floes, of various shapes and magnitudes.

5. *Brash-ice* is still smaller than drift-ice, and may be considered as the wreck of other kinds of ice.

6. *Bay-ice* is that which is newly-formed on the sea, and consists of two kinds, common bay-ice and *pancake*-ice; the former occurring in smooth extensive sheets, and the latter in small circular pieces, with raised edges.

7. *Sludge* consists of a stratum of detached ice crystals, or of snow, or of the smaller frag-

ments of brash-ice, floating on the surface of the sea.

8. A *hummock* is a protuberance raised upon any plane of ice above the common level. It is frequently produced by pressure, where one piece is squeezed upon another, often set upon its edge, and in that position cemented by the frost. Hummocks are likewise formed by pieces of ice mutually crushing each other, the wreck being heaped upon one or both of them. To hummocks, principally, the ice is indebted for its variety of fanciful shapes, and its picturesque appearance. They occur in great numbers in heavy packs, on the edges, and occasionally in the middle of fields and floes, where they often attain the height of thirty feet or upwards.

9. A *calf* is a portion of ice which has been depressed by the same means as a hummock is elevated. It is kept down by some larger mass, from beneath which it shows itself on one side.

10. A *tongue* is a point of ice projecting nearly horizontally from a part that is under water. Ships have sometimes run aground upon tongues of ice.

11. A *pack* is a body of drift-ice, of such magnitude that its extent is not discernible. A pack is *open* when the pieces of ice, though very near each other, do not generally touch, or *close* when the pieces are in complete contact.

12. A *patch* is a collection of drift or bay-ice,

of a circular or polygonal form. In point of magnitude, a pack corresponds with a field, and a patch with a floe.

13. A *stream* is an oblong collection of drift or bay-ice, the pieces of which are continuous. It is called a *sea-stream* when it is exposed on one side to the ocean, and affords shelter from the sea to whatever is within it.

14. *Open-ice*, or *sailing-ice*, is where the pieces are so separate as to admit of a ship sailing conveniently among them.

15. *Heavy* and *light* are terms attached to ice, distinguishable of its thickness.

16. *Land-ice* consists of drift-ice attached to the shore; or drift-ice which, by being covered with mud or gravel, appears to have recently been in contact with the shore; or the flat ice resting on the land, not having the appearance or elevation of icebergs.

17. A *bight* is a bay in the outline of the ice.

18. A *lane* or *vein* is a narrow channel of water in packs or other large collections of ice.

When the sea freezes, the greatest part of the salt it contains is deposited, and the frozen mass, however spongy, probably contains no salt but what is natural to the sea water filling its pores. Hence the generality of ice, when dissolved, affords fresh water. As, however, the ice frozen altogether from sea water does not appear so solid and transparent as that procured from snow or rain water, the whale-fishers distinguish it into two kinds, accordingly as it affords water that is potable, or the contrary, as it appears to have been the product of fresh or salt water.

What is considered as salt-water-ice appears blackish in the water, but in the air is of a white or grey colour, porous, and in a great measure opaque, (except when in very thin pieces,) yet transmits the rays of light with a blue or blueish green shade. When dissolved, it produces water sometimes perfectly fresh, and at others saltish. This depends, in a great measure, on the situation from whence it is taken; such parts as are raised above the surface of the sea, in the form of hummocks, or which, though below the surface, have been long frozen, appear to gain solidity, and are commonly *fresh;* whilst those pieces taken out of the sea, that have been recently frozen, are somewhat salt.

Fresh-water-ice of the sailors is distinguished by its black appearance when floating in small pieces in the sea, and by its transparency when removed into the air. Fresh-water-ice is fragile, but hard; the edges of a fractured part are frequently so keen as to inflict a wound like glass. The most transparent pieces are capable of concentrating the rays of the sun, so as to produce a considerable intensity of heat. With a lump of ice, of by no means regular convexity, I have frequently burned wood, fired gunpowder, melted lead, and lit the sailors' pipes, to their great astonishment, all of whom, who could procure the needful articles, eagerly flocked around me, for the satisfaction of smoking a pipe ignited by such extraordinary means. Their astonishment was increased by observing that the ice remained firm and pellucid, while the solar rays emerging from it were so hot, that the hand could not be kept longer in the focus than for the space of a few seconds. In the formation of these lenses, I roughed them out with a small axe, and then scraped them with a knife, polishing them merely by the warmth of the hand, supporting them during the operation in a woollen glove. I once procured a piece of the purest ice, so large that a lens of sixteen inches diameter was obtained out of it; unhappily, however, the sun became obscured before it was completed, and never made its appearance again for a fortnight, during which time, the air being mild, the lens was spoiled.

All young ice, such as bay-ice and light-ice, which form a considerable part of drift and pack-ice in general, is considered by Greenland sailors salt-water-ice; while fields, floes, bergs, and heavy-ice, chiefly consist of fresh-water-ice. Brash-ice likewise affords fine specimens of the latter, which, when taken out of the sea, are always found crowded on the surface with sharp points and conchoidal excavations.

Ice, when rapidly dissolved, continues solid as long as any remains, but, when exposed to the air, at a temperature of only two or three degrees above the freezing point, its solution is effected in a very peculiar manner. Thus, a large lump of fresh-water-ice, when acted on by such a process, if placed in the plane of its formation, resolves itself into considerable columns of a prismatic appearance. These columns are situated in a perpendicular position, almost entirely detached, so that when a blow is struck with an axe, the whole mass frequently falls to pieces. In the land icebergs, these columns are often of amazing magnitude, so as, when separated, to form floating icebergs.

All the ice floating in the sea is generally rough and uneven on the surface, and during the greater part of the year covered with snow. Even newly-formed ice, which is free from snow, is so rough and soft that it cannot be skated upon. Under water the colour of the ice varies with the colour of the sea; in blue water it is blue, in green water it is green, and of deeper shades in proportion to its depth. In the thickest olive-green coloured water, its colour, far beneath the surface, appears brownish.

A description of the process of freezing from its commencement may now be attempted. The first appearance of ice, when in a state of detached crystals, is called by the sailors *sludge*, and resembles snow when cast into water that is too cold to dissolve it. This smooths the ruffled surface of the sea, and produces an effect like oil in preventing breakers. These crystals soon unite, and would form a continuous sheet, but, by the motion of the waves, they are broken in very small pieces, scarcely three inches in diameter. As they strengthen, many of them coalesce, and form a larger mass. The undulations of the sea still continuing, these enlarged pieces strike each other on every side, whereby they become rounded, and their edges turn up, whence they obtain the name of *cakes*, or *pancakes*. Several of these again unite, and thereby continue to increase, forming larger flakes, until they become perhaps a foot in thickness, and many yards in circumference. Every larger flake retains on its surface the impression of the smaller flakes of which it is composed, so that when, by the discontinuance of the swell, the whole is permitted to freeze into an extensive sheet, it sometimes assumes the appearance of a pavement. But when the sea is perfectly smooth, the freezing process goes on more regularly, and probably more rapidly. During twenty-four hours' keen frost, the ice will become an inch or two in thickness, and in less than forty-eight hours' time capable of sustaining the weight of a man. Both this kind, and cake-ice, are termed bay-ice. In every opening of the main body of ice at a distance from the sea, the water is always as smooth as that of a harbour; and in low temperatures, all that is necessary for the formation of ice is still water. There is no doubt that a large quantity of ice is annually generated in the bays and amidst the islands of Spitzbergen; which bays, towards the end of summer, are commonly emptied of their contents, from the thawing of the snow on the mountains causing a current outwards. But this will not account for the immense fields which are so abundant in Greenland. These evidently come from the northward, and have their origin between Spitzbergen and the Pole.

Ice-fields constitute one of the wonders of the deep. They are often met with of the diameter of twenty or thirty miles, and when in the state of such close combination that no interstice could be seen, they sometimes extend to a length of fifty or a hundred miles. The ice of which they are composed is generally pure and fresh, and in heavy fields it is probably of the average thickness of ten to fifteen feet, and then appears to be flat, low, thin ice; but when high hummocks occur, the thickness is often forty feet and fifty feet. The surface before the month of July is always covered with a bed of snow, from perhaps a foot to a fathom in depth. This snow dissolves in the end of summer, and forms extensive pools and lakes of fresh water. Some of the largest fields are very level and smooth, though generally their surfaces are varied with hummocks. In some, these hummocks form ridges or chains, in others, they consist of insulated heaps. I once saw a field which was so free from either fissure or hummock, that I imagined, had it been free from snow, a coach might have been driven many leagues over it in a direct line, without obstruction or danger. Hummocks somewhat relieve the uniformity of intense light reflected from the surface of fields, by exhibiting shades of delicate blue in all the hollows, where the light is partly intercepted by passing through a portion of ice.

When the surface of snow on fields is frozen, or when the snow is generally dissolved, there is no difficulty in travelling over them, even without snow-skates or sledges. But when the snow is soft and deep, travelling on foot to any distance is a work of labour. The tribe of Esquimaux, discovered by captain Ross, made use of sledges, drawn by dogs, for conveying them across the rough land-ice, lying between the ships and the shore. A journey they performed with such celerity, that captain Ross conjectured they could travel fifty or sixty miles a day. If such a distance were practicable on drift-ice, occurring near shore, it would be much more easy on the smoother ice of fields.

This term, *field*, was given to the largest sheets of ice by a Dutch whale-fisher. It was not until a period of many years after the Spitzbergen fishery was established, that any navigator attempted to penetrate the ice, or that any of the most extensive sheets of ice were seen. One of the ships resorting to Smeerenberg for fishery, put to sea on one occasion when no whales were seen, persevered westward to a considerable length, and accidentally fell in with some immense flakes of ice, which, on his return to his companions, he described as truly wonderful, and as resembling fields in the extent of their surface. Hence the application of the term field to this kind of ice. The discoverer of it was distinguished by the title of "field-finder."

Fields commonly make their appearance in the months of May or June, though sometimes earlier; they are frequently the resort of young whales. Strong north and westerly winds expose them to the whalers by driving off the loose ice. The invariable tendency of fields is to drift to the south-westward, even in calms, which is the means of many being yearly destroyed. They have frequently been observed to advance a hundred miles in this direction within the space of one month, notwithstanding the occurrence of winds from every quarter. On emerging from amidst the smaller ice, which before sheltered them, they are soon broken up by the swell, are partly dissolved, and partly converted into drift-ice. The places of such are supplied by others from the north. The power of the swell in breaking the heaviest fields is not a little remarkable. A grown swell, that is so inconsiderable as not to be observed in open water, frequently breaks up the largest fields, and converts them wholly into floes and drift-ice in the space of a few hours; while fields composed of bay-ice, or light-ice, being more flexible, endure the same swell without any destructive effort.

The occasional rapid motion of fields, with the strange effects produced by such immense bodies on any opposing substance, is one of the most striking objects the Polar seas present, and is certainly the most terrific. They not unfrequently acquire a rotatory movement, whereby their circumference attains a velocity of several miles per hour. A field thus in motion, coming in contact with another at rest, or more especially with another having a contrary direction of movement, produces a dreadful shock. A body of more than ten thousand millions of tons in weight, meeting with resistance when in motion, produces consequences which it is scarcely possible to conceive. The weaker field is crushed with an awful noise; sometimes the destruction is mutual; pieces of huge dimensions and weight are not unfrequently piled upon the top, to the height of twenty or thirty feet, while a proportionate quantity is depressed beneath. The view of these stupendous effects in *safety* exhibits a picture sublimely grand, but where there is danger of being overwhelmed, terror and dismay must be the predominant feelings. The whale-fishers at all times require unremitting vigilance to secure their safety, but scarcely in any situation so much as when navigating amidst these fields; in foggy weather, they are particularly dangerous, as their motions cannot then be distinctly observed. It may easily be imagined, that the strongest ship is but an insignificant impediment between two fields in motion. Numbers of vessels, since the establishment of the fishery, have been thus destroyed; some have been thrown upon the ice, some have had their hulls completely torn open, or divided in two, and others have been overrun by the ice, and buried beneath its heaped fragments. The Dutch have lost as many as twenty-three sail of ships among the ice in one year. In the season of 1684, fourteen of their ships were wrecked, and eleven more remained beset during the winter.

In the month of May, of the year 1814, I witnessed a tremendous scene. While navigating amidst the most ponderous ice which the Greenland Sea presents, in the prospect of making our escape from a state of *besetment*, our progress was unexpectedly arrested by an isthmus of ice, about a mile in breadth, formed by the coalition of the point of an immense field on the north, with that of an aggregation of floes on the south. To the north field we moored the ship, in the hope of the ice separating in this place. I then quitted the ship, and travelled over the ice to the point of collision, to observe the state of the bar, which now prevented our release. I immediately discovered that the two points had but recently met, that already a prodigious mass of rubbish had been squeezed upon the top, and that the motion had not abated. The fields continued to overlay each other with a majestic motion, producing a noise resembling that of complicated machinery, or distant thunder. The pressure was so immense, that numerous fissures were occasioned, and the ice repeatedly rent beneath my feet. In one of the fissures, I found the snow on the level three and a half feet deep, and the ice upwards of twelve. In one place, hummocks had been thrown up to the height of twenty feet from the surface of the field, and at least twenty-five feet from the level of the water; they extended fifty or sixty yards in length, and fifteen in breadth, forming a mass of about two thousand tons in weight. The majestic, unvaried movement of the ice, the singular noise by which it was accompanied, the tremendous power exerted, and the wonderful effects produced—were calculated to excite in the mind of the most careless spectator admiration of Him with whom "the nations are as a drop of a bucket, and are counted as the small dust of the balance: behold, he taketh up the isles as a very little thing."

The term *icebergs* has commonly been applied to the glaciers occurring in Spitzbergen, Greenland, and other arctic countries. It is also as commonly extended to the large peaks, mountains, or islets of ice that are found floating in the sea. It is the latter kind of icebergs we purpose to describe.

Icebergs occur in many places in the arctic and antarctic regions; some of them of astonishing magnitude. In the Spitzbergen Sea, indeed, they are neither numerous nor bulky, compared with those of other regions; the largest I ever met with in this quarter not exceeding a thousand yards in circumference, and two hundred feet in thickness. But in Hudson's Strait, Davis's Strait, and Baffin's Bay, they occur of a prodigious size. Ellis describes them as sometimes occurring of the thickness of five hundred or six hundred yards. Frobisher saw one iceberg which was judged to be "near fourscore fathoms above water." One berg is described by captain Ross (the dimensions of which were given in by lieutenant Parry*) as having nine unequal sides, as being aground in sixty-one fathoms, and as measuring 4,169 yards (paces) long, 3,689 yards broad, and fifty-one feet high. The weight of this iceberg, taken at somewhat smaller dimensions, was estimated, by an officer of the Alexander, at 1,292,397,673 tons. This amount, however, is greater than the truth, the cubical inch of ice being taken at 240 grains, whereas it does not exceed 231·5 grains.

The most abundant source of icebergs known in the arctic regions is Baffin's Bay. 'From this remarkable sea they constantly make their way towards the south, down Davis's Strait, and are scattered abroad in the Atlantic to an amazing extent. The banks of Newfoundland are occasionally crowded with these wonderful

* Now sir John Ross and sir Edward Parry.

productions of the frigid zone; beyond which they are sometimes conveyed, by the operation of the southerly under-current, as low as latitude 40° north, and even lower, a distance of at least two thousand miles from the place of their origin.

Icebergs commonly float on a base which is larger in extent than the upper surface. Hence the proportion of ice appearing above water is seldom less in elevation than one-seventh of the whole thickness; and when the summit is conical, the elevation above water is frequently one-fourth of the whole depth of the berg. Perhaps the most general form of icebergs is with one high perpendicular side, the opposite side very low, and the intermediate surface forming a gradual slope. When of such a form, captain Ross found that the higher end was generally to windward. Some icebergs have regular flat surfaces, but most usually they have different acute summits, and occasionally exhibit the most fantastic shapes. Some have been seen that were completely perforated, or containing prodigious caverns, or having many clefts or cracks in the most elevated parts, so as to give the appearance of several distinct spires. On some icebergs, where there are hollows, a great quantity of snow accumulates; others are smooth and naked. The naked sides are often filled with conchoidal excavations, of various magnitudes; sometimes with hollows the size of the finger, and as regular as if formed by art. On some bergs, pools of water occur stagnant; on others, large streams are seen oozing through crevices into the sea. In a high sea, the waves break against them as against a rock; and, in calm weather, where there is a swell, the noise made by their rising and falling is tremendous. When icebergs are aground, or when there is a superficial current running to leeward, the motion of other ice past them is so great that they appear to be moving to windward. Fields of ice, of considerable thickness, meeting a berg under such circumstances, are sometimes completely ripped up and divided through the middle. Icebergs, when acted on by the sun, or by a temperate atmosphere, become hollow and fragile. Large pieces are then liable to be broken off, and fall into the sea with a terrible crash, which, in some places, produces an echo in the neighbouring mountains. When this circumstance, called *calving*, takes place, the iceberg loses its equilibrium, sometimes turns on one side, and is occasionally inverted. The sea is thereby put into commotion, fields of ice in the vicinity are broken up, the waves extend, and the noise is heard to the distance of several miles; and sometimes the rolling motion of the berg not ceasing, other pieces get loosened and detached, till the whole mass falls asunder like a wreck.

Icebergs differ a little in colour according to their solidity and distance, or state of the atmosphere. A very general appearance is that of cliffs of chalk, or of white or grey marble. The sun's rays reflected from them sometimes give a glistening appearance to their surfaces. Different shades of colour occur in the precipitous parts, accordingly as the ice is more or less solid, and accordingly as it contains strata of earth, gravel, or sand, or is free from any impurity. In the fresh fracture, greenish grey, approaching to emerald green, is the prevailing colour. In the night, icebergs are readily distinguished, even at a distance, by their natural effulgence; and in foggy weather, by a peculiar blackness in the atmosphere, by which the danger to the navigator is diminished. As, however, they occur far from land, and often in unexpected situations, navigators require to be always on the watch for them. Though often dangerous neighbours, they have occasionally proved useful auxiliaries to the whale-fishers. Their situation in a smooth sea is very little affected by the wind; under the strongest gale they are not perceptibly moved, but, on the contrary, have the appearance of advancing to windward, because every other description of ice moves rapidly past them. From the iceberg's firmness, it often affords a stable mooring to the ship in strong adverse winds, and the fisher likewise avails himself of it when his object is to gain a windward situation more open. He moors under the lee of the iceberg, loose ice soon forces past, the ship remains nearly stationary, and the wished-for effect seldom fails to result. Vessels have, however, often been staved, and sometimes wrecked, by the fall of their icy mooring; while smaller objects, such as boats, have been repeatedly overwhelmed, even at a considerable distance, by the vast waves occasioned by such events.

All ice becomes exceedingly fragile towards the close of the whale-fishing season, when the temperate air thaws its surface, and changes its solid structure into a brittle mass of imperfectly attached columns. Bergs in this state being struck by an axe, for the purpose of placing a mooring anchor, have been known to rend asunder, and precipitate the careless seaman into the yawning chasm; whilst, occasionally, the masses are hurled apart, and fall in contrary directions with a prodigious crash, burying boats and men in one common ruin. The awful effect produced by a solid mass, many thousands, or even millions, of tons in weight, changing its situation with the velocity of a falling body, whereby its aspiring summit is in a moment buried in the ocean, can be more easily imagined than described. Though a blow with an edge-tool on brittle ice does not sever the mass, still it is often succeeded by a crackling noise, proving the mass to be ready to burst from the force of internal expansion, or from the destruction of its texture by a warm temperature. It is common, when ships moor to icebergs, to lie as remote from them as their ropes will allow, and yet accidents sometimes happen, though the ship ride at the distance of a hundred yards from the ice. In the year 1812, while the Thomas, of Hull, captain Taylor, lay moored to an iceberg in Davis's Strait, a *calf* was detached from beneath, and rose with such tremendous force, that the keel of the ship was lifted on a level with water at the bow, and the stern was nearly immersed beneath the surface. Fortunately, the blow was received on the keel, and the ship was not materially damaged.

From the deep pools of water found in the summer season on the depressed surface of some bergs, or from streams running down their sides, the ships navigating where they abound are presented with opportunities for watering with the greatest ease and dispatch. For this purpose, casks are landed upon the lower bergs, filled, and rolled into the sea; but, from the higher, the water is conveyed by means of a long tube of canvas, or leather, called a *hose*, into casks placed in the boats, at the side of the ice, or even upon the deck of the ship.

The greater part of the icebergs that occur in Davis's Strait, and on the eastern coast of North America, notwithstanding their profusion and immense magnitude, seem to be merely fragments of the land icebergs, or glaciers, which exist in great numbers on the coast forming the boundaries of Baffin's Bay. These glaciers fill immense valleys, and extend, in some places, several miles into the sea; in others, they terminate with a precipitous edge at the general line formed by the coast. In the summer season, when they are particularly fragile, the force of cohesion is often overcome by the weight of the prodigious masses that overhang the sea; and, in winter, the same effect may be produced by the powerful expansion of the water filling any excavation, or deep-seated cavity, when its dimensions are enlarged by freezing, thereby exerting a tremendous force, and bursting the berg asunder. Pieces thus, or otherwise, detached, are hurled into the sea with a dreadful crash. When they fall into sufficiently deep water, they are liable to be drifted off the land, and down Davis's Strait, according to the set of the current; but, if they fall into a shallow sea, they must remain until sufficiently wasted to float away.

Spitzbergen is possessed of every character which is supposed to be necessary for the formation of the largest icebergs; high mountains, deep extensive valleys, intense frost, occasional thaws, and great falls of sleet and snow; yet here a berg is rarely met with, and the largest that occur are not to be compared with the productions of Baffin's Bay. The reason of the difference between Spitzbergen and Old Greenland as to the production of icebergs is, perhaps, this—that, while the sea is generally deep, and the coast almost continually sheltered by drift-ice at the foot of the glaciers, in Baffin's Bay; in Spitzbergen, on the contrary, they usually terminate at the water's edge, or where the sea is shallow, so that no very large mass, if dislodged, can float away, and they are, at the same time, so much exposed to heavy swells, as to occasion dismemberments too frequently to admit of their attaining considerable magnitude.

That extensive body of ice which, with occasional tracts of land, occupies the northern extremity of the earth, and prevents all access to the regions immediately surrounding the Pole, fills, it appears, on an average, a circle of above two thousand geographical miles diameter, and presents an outline which, though subject to partial variations, is found at the same season of each succeeding year to be generally similar, and often strikingly uniform. The most remarkable alteration in the configuration of the Polar ice on record, is that said to have taken place between Iceland and Greenland, in the beginning of the fifteenth century, whereby the intercourse between the Icelanders and the colonies in Greenland was interrupted; and, although many attempts have been made on the part of Denmark for the recovery of these colonies, and for ascertaining the fate of the colonists, they have not yet succeeded. In various countries, changes of climate, to a certain extent, have occurred within the limits of historical record; these changes have been commonly for the better, and have been considered as the effects of human industry, in draining marshes and lakes, felling woods, and cultivating the earth; but here is an occurrence which, if it be indeed true, is the reverse of common experience, and concerning the causes of which it is not easy to offer any conjecture.

With each recurring spring, the north Polar ice presents the following general outline. Filling the Bays of Hudson and Baffin, as well as the Straits of Hudson, and part of that of Davis, it exhibits an irregular, waving, but generally continuous line, from Newfoundland or Labrador to Nova Zembla. From Newfoundland it extends in a northerly direction along the Labrador shore, generally preventing all access to the land, as high as the mouth of Hudson's Strait; then, turning to the north-eastward, forms a bay near the coast of Greenland, in latitude perhaps 66° or 67°, by suddenly passing away to the southward to the extremity of Greenland. The quantity of ice on the east side of Davis's Strait being often small, the continuity of its border is liable to be broken, so as to admit of ships reaching the land; and sometimes the bay of the ice, usually occurring in the spring, in latitude 66° or 67°, does not exist, but the sea is open up the strait to a considerable distance beyond it. After doubling the southern promontory, or Cape Farewell, it advances in a north-eastern direction along the east coast, sometimes enveloping Iceland as it proceeds, until it reaches the Island of Jan Mayen. Passing this island on the north-west, but frequently inclosing it, the edge of the ice then trends a little more to the eastward, and usually intersects the meridian of London between the 71st and 73rd degree of latitude. Having reached the longitude of 5° or 6° east, in some instances as far as 8° or 10°, in the 73rd or 74th degree of north latitude, it joins a remarkable promontory, and suddenly stretches to the north, sometimes proceeding on a meridian to the latitude of 80°, at others forming a deep sinuosity, extending two or three degrees to the northward, and then south-easterly to Cherie Island, which, having passed, it assumes a more direct course a little to the southward of east, until it forms a junction with the Siberian or Nova Zemblan coast.

During the winter and spring months, the Polar ice seems closely to embrace the whole of the northern shores of Russia, to the eastward of Nova Zembla, and filling, in a great measure, Behring's Strait and the sea to the northward of it, continues in contact with the Polar face of the American continent, following the line of the coast to the eastward, until it effects a junction with the ice in the Spitzbergen Sea, or in the great north-western bays of Hudson and Baffin, or is terminated by land yet undiscovered.

That remarkable promontory midway between Jan Mayen and Cherie Islands, formed by the sudden stretch of the ice to the north, constitutes the line of separation between the east, or *whaling*, and west, or *sealing*, ice of the fishers; and the deep bay lying to the east of this promontory, which may be called the *Whale-fisher's Bight*, invariably forms the only pervious track for proceeding to fishing latitudes northward. When the ice at the extremity of this bay occurs so strong and compact as to prevent the approach to the shores of Spitzbergen, and the advance northward beyond the latitude of 75° or 76°, it is said to be a *close season*, and, on the contrary, it is called an *open season* when an uninterrupted navigation extends along the western coast of Spitzbergen to Hackluyt's Headland.

The place where whales occur in the greatest abundance is generally found to be in 78° or 79° of north latitude, though, from the 72nd to the 81st degree they have been met with. They prefer those situations which afford them the most secure retreats, and the course of their flight when scared or wounded is generally towards the nearest or most compact ice. The place of their retreat, however, is regulated by various circumstances; it may sometimes depend on the quality or quantity of food occurring, the disposition of the ice, or exemption from enemies. Sometimes they seem collected within a small and single circuit; at others, they are scattered in various hordes and numerous single individuals over an amazing extent of surface. In *close seasons*, though the ice joins the south of Spitzbergen, and thereby forms a *barrier* against the fishing-stations, yet this barrier is often of a limited extent, and terminates on the coasts of Spitzbergen in an open space, either forming or leading to the retreat of the whales. Such space is sometimes frozen over till the middle or end of the month of May, but not unfrequently free from ice. The barrier here opposed to the fisher usually consists of a body of ice, from twenty to thirty or forty leagues across in the shortest diameter. It is of importance to pass this barrier of ice as early as possible in the season. The fisher here avails himself of every power within his command. The sails are expanded in favourable winds, and withdrawn in contrary breezes. The ship is urged forward amongst drift-ice by the force of the wind, assisted with ropes and saws. Whenever a vein of water appears in the required direction, it is, if possible, attained. It always affords a temporary relief, and sometimes a permanent release, by extending itself through intricate mazes, amidst ice of various descriptions, until at length it opens into the desired place, void of obstruction, constituting the usual retreat of the whales.

The barrier which we have described, when it occurs, is regularly encountered on the first arrival of the Greenland ships in the month of April, but is generally removed by natural means as the season advances. It is usually found separate from the land, and divided asunder by the close of the month of June; and hence it is that, however difficult and laborious may have been the ingress into the fishing country, the egress is commonly effected without much inconvenience. In the month of May, the severity of the frost relaxes, and the temperature generally approaches a few degrees of the freezing point. The salt in the sea then exerts its liquefying influence, and destroys the tenacity of the bay-ice, makes inroads in its parts by enlarging its pores into holes, diminishes its thickness, and, in the language of the whale-fisher, completely rots it. Packed drift-ice is then liberated, and obeys the slightest impulses of the winds or currents. The heavier having more stability than the lighter, an apparent difference of movement obtains among the pieces, and holes and lanes of water are formed to allow the entrance and progress of the ships. Bay-ice, though sometimes serviceable to the whalers in preserving them from the brunt of the heavy ice, is often the means of besetment, and hence the primary cause of every calamity. Heavy ice, many feet in thickness, and in detached pieces of from fifty to a hundred tons' weight each, though crowded together in the form of a pack, may be penetrated in a favourable gale with tolerable dispatch, whilst a sheet of bay-ice, of a few inches only in thickness, with the same advantage of wind, will often arrest the progress of the ship, and render her in a few minutes immovable. If this ice be too strong to be broken by the weight of the boat, recourse must be had to sawing, an operation slow and laborious in the extreme.

When the warmth of the season has rotted the bay-ice, the passage to the northward can generally be accomplished with a very great saving of labour. Therefore it was the older fishers seldom or never used to attempt it before the 10th of May, and foreign fishers in the present day are in general late. Sometimes late arrivals are otherwise beneficial, since it frequently happens, in *close seasons*, that ships entering the ice about the middle of May obtain an advantage over those preceding them, by gaining a situation more eligible, on account of its nearness to the land. Their predecessors, meanwhile, are drifted off to the westward with the ice, and cannot recover their easting. Hence, it appears, it would be economical and beneficial to sail so late as not to reach the *country* before the middle of May, or to persevere on the sealing stations until that time. There are, however, some weighty objections to this method. Open seasons occasionally occur, and great progress may be made, especially by superior fishers, before that time. A week or a fortnight's solitary fishing, under favourable circumstances, has frequently gained half a cargo. The change which takes place in the ice, amidst which the whale-fisher pursues his object, is, towards the close of the *season*, indeed astonishing. For, not only does it separate into its original individual portions, not only does it retreat in a body from the western coast of Spitzbergen, but, in general, that barrier of ice which incloses the fishing-site in the spring, which costs the fisher immense labour and anxiety to penetrate, by retarding his advance towards the north, and his progress in the fishery, for the space of several weeks, spontaneously divides in the midst about the month of June, and, on the return of the ships, is not at all to be seen. Then is the sea rendered freely navigable from the very haunts of the whales to the expanse of the Atlantic Ocean.

Our remarks may now be directed, for a few pages, to the properties, peculiar movements, and drifting of the ice.

1. The ice always has a tendency to separate during calms.

2. Openings in packs and among fields, or floes, frequently break out, or disappear, without any apparent cause.

3. Fields often open, close, and revolve, in the most extraordinary manner, in calms as well as in storms.

4. The amazing changes which take place amongst the most compact ice are often unaccountable

5. When speaking of the currents of the Spitzbergen Sea, it has been remarked that the Polar ice, in this situation, has a constant tendency to drift to the south-westward. Near Spitzbergen, indeed, this tendency is not usually observed, because the influence of the tide, eddies, peculiar pressures, etc., sometimes produce a contrary effect; but, at a distance from land, its universal prevalence is easily illustrated.

In the beginning of May, 1814, we entered with the ship Esk, of Whitby, a spacious opening of the ice, in latitude 78° 10′, longitude 4° east, to a distance of ten or twelve leagues from the exterior, wherein we were tempted to stay, from the appearance of a great number of whales. On the 9th of May, the ship became fixed in the ice, and, until the 16th, we lay immovable. A break of the bay-ice then appeared about half-a-mile from us, to attain which we laboured with energy, and, in eight hours, accomplished a passage for the ship. On the 20th, in attempting to advance, we endured a heavy pressure of the bay-ice, which shook the ship in an alarming manner. After a fatiguing effort in passing through the midst of an aggregation of floes against the wind, we reached a channel, which led us several miles to the south-eastward; and, on the 23rd, we lay at rest with four other ships. The day following, having sawn a place for the ship in a thin floe, we forced forward between two large masses, where bay-ice, unconsolidated, had been compressed till it had become ten or twelve feet thick. We were assisted by a hundred men from the accompanying ships, which followed close in our rear. After applying all our mechanical powers during eight or nine hours, we passed the strait of about a furlong in length, and immediately the ice collapsed, and riveted the ships of our companions to the spot. We advanced on various winding courses to the distance of several miles, and then discovered a continuation of the navigation between two immense sheets of ice, but the channel was so narrow and intricate, that, for the distance of near a mile, it did not appear more than from ten to twenty yards in width. The prospect was, indeed, appalling; but, perceiving indications of the enlargement of the passage rather than the contrary, we advanced under a press of sail, driving aside some disengaged lumps of ice that opposed us, and shortly accomplished our wishes in safety. Here an enlivening prospect presented itself; to the extreme limits of the horizon no interruption was visible. We made a predetermined signal to the ships we had left, indicative of our hope of speedy release. In two hours, however, we were disappointed by meeting the fields in the act of collapsing, and completely barring our progress. As the distance across was scarcely a mile, and the sea, to appearance, clear beyond it, the interruption was most tantalizing. We waited at the point of union, and, on the morning of the 26th of May, our anxiety was happily relieved by the wished-for division of the ice. The ship, propelled by a brisk wind, darted through the strait, and entered a sea, which we considered the termination of our difficulties. After steering three hours to the south-eastward, we were concerned to discover our conclusions had been premature. An immense pack opened on our view, stretching directly across our path. There was no alternative but forcing through it; we therefore pushed forward into the least connected part. By availing ourselves of every advantage of sailing, where sailing was practicable, and *boring* or drifting where the pieces of ice lay close together, we at length reached the leeward part of a narrow channel, in which we had to ply a considerable distance against the wind. When performing this, the wind, which had hitherto blown a brisk breeze from the north, increased to a strong gale. The ship was placed in such a critical situation that we could not, for above an hour, accomplish any reduction of the sails; and while I was personally engaged performing the duty of a pilot on the topmast-head, the bending of the mast was so uncommon that I was seriously alarmed for its stability. At length, we were enabled to reef our sails, and for some time proceeded with less danger. Our direction was now east, then north for several hours, then easterly, ten or fifteen miles; when, after eighteen hours of the most difficult and occasionally hazardous sailing, in which the ship received some hard blows from the ice, after pursuing a tedious course nearly ninety miles, and accomplishing a distance on a direct north-east course of about forty miles, we found ourselves at the very margin of the sea, separated only by a narrow sea-stream. The sea was so great without, and the wind so violent, that we durst not hazard an attempt to force through this remaining obstacle. After waiting about thirty hours, on the morning of the 28th of May, the weather cleared, and the wind abated. The sea-stream was now augmented to upwards of a mile broad. One place alone was visible where the breadth was less considerable, and through it we accomplished our final escape into the open sea.

I have thus been minute in the relation of our extrication from an alarming, though not very uncommon state of besetment, in order to give a faint idea of the difficulties and dangers which those engaged in the whale-fishery have occasionally to encounter, as well as to illustrate the manner in which ships are carried away from their original situation by the regularity of the drift of ice to the south-westward. The life of the mariner is one always of great labour and peril, but in navigating these arctic seas he is exposed to sudden and peculiar dangers.

It is possible that the title and contents of this volume may allure to its perusal some who look forward to exposure to dangers such as those which are here described. They surely will not deem it intrusive to be reminded that the most important preparation for such undertakings, as well as for the whole of life, is to surrender the heart to that Saviour who has died to redeem his servants from guilt and ruin. The pardon and peace which he freely confers on all who come to him, are the only safe comforts of a departing soul. It is his blood only that cleanses from all sin; it is his Spirit that renews and sanctifies the mind; and whatever pain or accident may befal the body, there can be "no condemnation" in time or in eternity "to them which are in Christ Jesus." The message of God to man is the offer of a free salvation, through the death of his glorious Son. This offer must determine the eternal condition of all to whom it is in God's mercy revealed. "God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life!" Reader, do you understand, and have you accepted, this gracious message?

CHAPTER IV.

OBSERVATIONS ON THE ATMOSPHEROLOGY OF THE ARCTIC REGIONS, PARTICULARLY RELATING TO SPITZBERGEN AND THE ADJACENT GREENLAND SEA.

In treating of the subject of this chapter, our remarks shall, in the first instance, relate to the *climate of the Arctic Regions and the general effects of cold.* In the autumn and spring seasons, the climate of Spitzbergen and its adjacent sea is variable and tempestuous. The temperature passes through its extreme range, which, probably, exceeds fifty degrees in the same season, or even in the same month, with a rapidity unknown in countries situate within the temperate zones. North, west, and east winds bring with them the extreme cold of the icy regions immediately surrounding the Pole, whilst a shift of wind to the south-west, south, or south-east, elevates the temperature towards that of the neighbouring seas.

An arctic winter consists of the accumulation of almost everything among atmospheric phenomena that is disagreeable to the feelings, together with the privation of those bounties of

Heaven with which other parts of the earth, in happier climates, are so plentifully supplied. During the whole of the winter months, the cheering rays of the sun are neither seen nor felt, and there are occasional storms of wind and snow.

The most severe cold, says Crantz, that occurs in Greenland, sets in, as in temperate climates, "after the new year; and is so piercing in February and March, that the stones split in twain, and the sea reeks like an oven." On the return of the sun, the months of May, June, and August, are even occasionally pleasant; but with July, and partially with June and August, the densest fogs prevail, which are more depressing to the spirits than even intense cold.

The temperature of the atmosphere, when the fogs prevail, is generally near the freezing point, and is not above three or four degrees higher at midday than at midnight, and sometimes does not vary above a degree or two for several days together. But, in the spring and winter seasons, the temperature is subject to very great and rapid alterations, which are frequently simultaneous with the greatest changes of pressure. This renders the thermometer a valuable appendage in the prognostication of the weather.

The great depression of temperature which takes place in the proximity of ice with a northerly wind, appears equally as considerable to the feelings in low as in high latitudes. As great a degree of cold as ever I noticed in a series of twelve years' observations (once excepted) was in latitude 71¼°, April 12, 1814, when the mean of three thermometers indicated zero; and, on the same occasion, during an interval of three days, the mean temperature was less than 5°. The wind in the mean time was continually blowing from the north-eastward, generally blowing a gale, but sometimes moderate. On the 25th of April, 1813, in latitude 8°, the thermometer fell to 4°, during a hard gale from the north-east, but on account of the ship being driven away from the ice it soon rose to 10° or 15°. The effect of the ice in reducing the temperature is so considerable, that our proximity to it is often announced by the coldness before it can be seen. In this manner, the difference of a few leagues in position sometimes produces a surprising increase of cold.

The Greenland sailors, being well defended from external cold by a choice selection of warm clothing, generally support the lowest temperature, after a few days' habitude, without much inconvenience. When, however, its attacks are not gradual, as when a ship, which has attained the edge of the ice, under a southerly gale, is exposed suddenly to a northerly breeze, the change of temperature is so great and rapid, that the most hardy cannot conceal their uneasiness under its first impression. On one occasion, in the year 1814, there was between the time of my leaving the deck at night and arising the following morning an increase in the cold of about 20°. This remarkable change was attended with singular effects. The circulation of the blood was accelerated, a sense of parched dryness was excited in the nose; the mouth, or rather lips, were contracted in all their dimensions, as by a sphincter, and the articulation of many words was rendered difficult and imperfect; indeed, every part of the body was more or less stimulated or disordered by the severity of the cold. The hands, if exposed, would have been frozen in a few minutes, and even the face could not have resisted the effects of a brisk wind, continued for any length of time. A piece of metal, when applied to the tongue, instantly adhered to it, and could not be removed without its retaining a portion of the skin; iron became brittle, and such as was at all of inferior quality might be fractured by a blow; brandy, of English manufacture and wholesale strength, was frozen; quicksilver, by a single process, might have been consolidated; the sea, in some places, was in the act of freezing, and, in others, appeared to smoke, and produced, in the formation of *frost-rime*, an obscurity greater than that of the thickest fog.

The subtle principle of magnetism seemed to be, in some way or other, influenced by the frost, for the deck compasses became sluggish, or even motionless, while a cabin compass traversed with celerity. The ship became enveloped in ice; the bows, sides, and lower rigging, were loaded; and the rudder, if not repeatedly freed, would, in a short time, have been rendered immovable. A considerable swell at this time prevailing, the smoke in the cabin, with the doors closed, was so intolerable, that we were under the necessity of giving free admission to the external air to prevent it. The consequence was, that, in front of a brisk fire, at the distance of a yard and a half from it, the temperature was 25°; water spilt on the table froze, and, indeed, congelation took place in one situation at the distance of only two feet from the stove. Hoar-frost, also, appeared in the sailors' bed-cabins, arising from their breath, and was deposited upon their blankets.

Under such a temperature, the whale-fishery could not be prosecuted, for nature could not sustain continued exposure to the pungent force of the wind. With a calm atmosphere, however, the sensible effects of cold are singularly diminished; the cold of zero then becomes equally supportable with the temperature of 10, 15, or even 20 degrees, when impressed by a brisk wind; hence, the sensations produced on the body become a very equivocal criterion for estimating the degree of cold.

The effect of cold in preventing the traversing of compasses, exposed to its influence, has been noticed by some navigators. As a remedy against this inconvenience, Ellis, in his voyage to Hudson's Bay, suggests the propriety of removing the compasses into a warm place, by which the needles speedily resume their activity. I have found, by experiments, that neither the attractive nor directive power of the magnet suffers diminution by an increase of cold. There appears, however, to be an increase of friction, or the introduction of some unknown principle, which, when the degree of cold is very much increased, occasions a diminution in the mobility of magnetic needles.

Many remarkable effects of cold are related in the journals of Polar navigators. Captain James, when wintering in Hudson's Bay, latitude 52° north, experienced such cold, that, on the 10th December, many of the sailors had their noses, cheeks, and fingers, frozen as white as paper. Ellis, who wintered in the same region, latitude 57° 30′, found, by the 3rd of November, bottled beer, though wrapped in tow, and placed near a good, constant fire, frozen solid. Many of the sailors had their faces, ears, and toes frozen; iron adhered to their fingers; glasses used in drinking stuck to the mouth, and sometimes removed the skin from the lips or tongue; and a sailor, who inadvertently used his finger for stopping a spirit-bottle in place of a cork, while removing it from the house to his tent, had his finger fast frozen in the bottle, in consequence of which a part of it was obliged to be taken off to prevent mortification.

A Hamburgh whaler, beset by the ice, near Spitzbergen, in the year 1769, was exposed to great danger. The effect of the frost was such, that the seams in the ship's sides cracked with a noise resembling the report of a pistol. These openings at first rendered the vessel very leaky, but after she got free from the ice, and into a milder climate, they again closed.

In the interesting narrative, by Pelham, of the preservation of eight seamen, who were accidentally left in Spitzbergen, in the year 1630, and wintered there, are some remarks on the effects of cold. The sea of the bay, where they took up their abode, froze over on the 10th of October. After the commencement of the new year, the frost became most intense; it raised blisters in their flesh as if they had been burned with fire, and if they touched iron at such times it would stick to their fingers like bird-lime. Sometimes, when they went out of doors to procure water, they were seized in such a way by the cold, that their flesh felt as sore as if they had been cruelly beaten.

The effects of cold at Disco, as observed by M. Paul Egedé, on the 7th January, 1738, and recorded by David Crantz, in his History of Greenland, are too striking to be omitted. "The ice and hoar-frost," says Egedé, "reach through the chimney to the stove's mouth, without being thawed by the fire in the day-time. Over the chimney is an arch of frost, with little holes, through which the smoke discharges itself. The doors and walls are as if they were plastered over with frost, and, which is scarcely credible, beds are often frozen to the bedsteads. The linen is frozen in the drawers, the upper eider-down bed and the pillows are quite stiff with frost an inch thick, from the breath."

The terrific power of these mighty agencies of nature illustrate His perfections, who has all resources at his command, to minister to the comfort of his servants, or the inevitable destruction of his enemies. To be hostile to the God of heaven and of earth, is surely the height of folly as well as of ingratitude. "He sendeth forth his commandment upon earth: his word runneth very swiftly. He giveth snow like wool: he scattereth the hoar-frost like ashes. He casteth forth his ice like morsels: who can stand before his cold?"

In these frigid regions, the scurvy becomes a very alarming disease, and many individuals have perished by it, who have attempted to winter in Spitzbergen and neighbouring countries. It appears, however, probable, that this disease is not so much influenced by the severity of the climate as by the use of improper aliment. An excellent paper on this subject, by Dr. John Aikin, is published in the Memoirs of the Literary and Philosophical Society of Manchester. It affirms, that by the constant use of fresh provisions, the occasional use of oleaginous substances, together with frequent exercise, a warm dwelling, and a warm clothing, there would, probably, be little danger in exposure to the severities of a Spitzbergen winter. Whenever I have had occasion to expose myself to severe cold, I have found that the more I am heated the longer I can resist the cold without inconvenience. The warmth produced by simple fluids, such as tea or soup, is preferable to that occasioned by spirits. After the liberal use of tea, I have often sustained a cold ten degrees at the mast-head for several hours without uneasiness. I have frequently gone from the breakfast-table, where the temperature was 50° or 60°, to the mast-head, where it was ten, without any other additional clothing except a cap, yet I never received any injury, and seldom much inconvenience, from the uncommon transition.

The antiseptical property of frost is remarkable. Animal substances requisite as food, of all descriptions, (fish excepted,) may be taken to Greenland, and there preserved any length of time, without being smoked, dried, or salted. Beef, mutton, pork, and fowls, the latter neither plucked nor drawn, are constantly taken out from England, Shetland, or Orkney, and preserved in this way. When used, the beef is best divided by a saw; it is then thawed in cold water, and, if cooked, when three, four, or five months old, will frequently appear as profuse of gravy as if it had been recently killed. A further antiseptical effect is produced by the cold on animal and vegetable substances, so as to preserve them, if they remain in the same climate, unchanged for a period of many years. An instance corroborative of this remark is given by M. Bleau, who, in his Atlas Historique, informs us, that the bodies of seven Dutch seamen, who perished in Spitzbergen, in the year 1635, were found twenty years afterwards by some sailors, who happened to land about the place where they were interred, in a perfect state, not having suffered the smallest degree of putrefaction. Wood, indeed, has been met with in Spitzbergen, which has resisted all injury from the weather during the lapse of a century.

Our remarks must now be directed to *meteorology*, and to an investigation of the temperature of the north Polar regions, and its constant tendency to equalization.

Though in a state of rapid improvement, the science of meteorology is acknowledged to be yet in its infancy. Before the discovery of the weight of the atmosphere by Torricelli, about the year 1630, no means of registering its variations of pressure could be known or practised. Hence we can have no very correct idea of the relative temperature of climates in the present and remote periods, unless from occasional historical remarks of the formation of ice in particular lakes, rivers, or parts of the sea, or from the capability of the earth for producing certain fruits or grain. In consequence, however, of the use of the thermometer and barometer, meteorology, as a science, has made considerable advancement. The records of phenomena, which these instruments indicate, have proved highly useful. Professor Mayer has given us a formula for determining the temperature of any situation on the globe, where observations have not been made. Dr. Hutton has presented us with an ingenious and plausible theory of rain; and Kirwan, Humboldt, and others, have advanced our knowledge of the climates of different countries. Dr. Wells has investigated the phenomena of dew, and professor Leslie has conducted profound researches on the relations of air to heat and moisture, and on the propagation of heat and cold through the atmosphere to distant regions. By the invention, also, of several curious and useful instruments, especially the hygrometer for the measurement of the dryness or dampness of the atmosphere, he has contributed very largely to the advancement of meteorological knowledge.

The temperature of the atmosphere in any particular region is one of those phenomena, which, however they may fluctuate, or whatever may be their daily, monthly, or yearly variations, and however unequal and capricious these may be, will, on the average of numerous corresponding periods, be found to be dependent on certain laws tending to produce equilibrium ; so that the general results are remarkably uniform. When we experience particularly cold winters, or particularly hot summers, we might suppose that the mean temperature of the years in which the former occur, would be greatly below, and that of years in which the hot summers occur, would be greatly above, the general standard. But this will seldom be found to be the case. In temperate climates of the northern hemisphere, the mean temperature of any one year, derived from the mean of the daily extremes of heat and cold, or from any particular number of daily observations, continued through the course of twelve successive months, seldom differs from the general mean temperature, as derived from the observation of a great number of years, more than two or three degrees. The mean temperature of any single month cannot be supposed to be equally uniform; this, however, does not differ so widely from the general mean of the month as might be expected.

As the mean annual temperature of a country is, therefore, probably given by one year's observations only, to within two or three degrees of the truth, the mean of a period of eight or ten years will, probably, come within one degree of the truth. By the comparison of the results of thermometrical observations, made in different countries, with each other, tracing the changes of temperature, which appear with certain changes of latitude or situation, some ingenious and philosophical men have endeavoured, by principles of analogy and induction, to determine the mean temperature of every parallel of latitude from the Equator to the north Pole. These calculations have been considered as near approximations; and, as long as observations were wanting, served for purposes of investigation, to complete the scale of the temperature of the globe. When we reach, however, the regions of perpetual ice, a remarkable anomaly is discovered, the mean temperature falling below the estimation in these tables at once 17°. From a series of observations on the temperature, etc., of the Polar regions, conducted with care during twelve successive voyages to the Greenland Seas, I am able to deduce the following conclusions.

The mean temperature of the months of April, May, June, and July, are satisfactorily derived from the means of the latitudes and of the observations of temperature; but the mean temperature of the whole year, and of the winter months, wherein no observations in such high latitudes have yet been made, can only be ascertained by analogy. From the examination of numerous thermometrical registers, particularly one consisting of 54,750 observations, made in a succession of fifty years, at Stockholm, it would seem that the temperature of the year in northern latitudes is indicated by that of the 27th to 28th of April. I have collated 656 observations, made on 242 days, in nine different years, extending equally before and after the 27th of April, from which the mean temperature of the year, in latitude 76° 45′, near the meridian of London, appears to be 18° 86′. Reducing all the monthly temperatures derived from my observations to the parallel of latitude 78° north, by the application of Mayer's formula, and allowing for the fact that many of the observations of April were made at a considerable distance from the ice, I calculate the temperature of April, latitude 78°, to be 14° 23′, and the mean of the year in the same proportion exactly 17°. Having discovered, by observation chiefly, the mean temperature of the months of April, May, June, and July, and the probable mean temperature of the year in the icy regions adjoining Spitzbergen, I conceive it not difficult to calculate the temperature of the remaining months. The difference between the mean temperature of the year and that of July, is 21½° in Stockholm, and 20° near Spitzbergen. Finding not only that the difference of temperature between the mean of the year and July, near Spitzbergen, but that the progressive increase of temperature from April to July, also, bore a strong analogy to the relative circumstances at Stockholm, I formed a scheme of decimals, connected with a simple formula, by which the same proportion of change, which has been observed to take place every month at Stockholm, may be made very readily to apply to any other country, whence, situations and circumstances being nearly similar, the temperature of unobserved months may be calculated. The temperature of January, latitude 78°, comes out —1°; that of February, 0° 7′; March, 6° 1′; August, 34° 9′; September, 27° 8′; October, 18° 5′; November, 9° 8′; and December, 3° 1′.

Following the example of every generalizing meteorologist, I may, with some propriety, extend my observations to the probable temperature of the north Pole, provided I can proceed on data, not merely arbitrary or fanciful, but founded on observation and analogy.

It has been observed, that professor Mayer's theory for ascertaining the temperature of every latitude, becomes exceedingly wide of the truth when we approach the regions of perpetual ice, notwithstanding in most other situations on the sea, or bordering thereon, it holds sufficiently near. According to it, the mean temperature of latitude 76° 45′, near the western coast of Spitzbergen, would have been 33° 8′, instead of 18° 8′, as shown by my observations; and, according to it, the mean temperature of the Pole is reckoned to be about 31°. The 15° difference between the observation and calculation must be considered as the frigorific effect of the ice, of which, if we can ascertain the probable measurement at the Pole, we shall be able to modify Mayer's calculation, so as to approximate to the mean temperature. At the Pole, no wind could convey the mild influence of a temperate climate, because, from whatever direction it should blow, it must be cooled down by brushing over an extensive surface of ice; consequently, the full frigorific effect of the ice must be greater in the Pole than in places situated at or near the borders of the ice. In a total period of 242 days, the temperature of the air was, by observation, found to be more or less influenced by the ice during 173 days of that period. Hence, as 173 is to 15°, the anomaly occasioned by the mean temperature, so is 242 to 21°, which is the probable anomaly that may be expected when the temperature is always influenced by the ice, or the anomaly which may be supposed to occur at the Pole. Now, if we deduct 21° from 31°, the calculated temperature of the Pole, the actual mean temperature at the Pole will be about 10°.

Concerning the pressure of the atmosphere in Polar latitudes, I would remark, particularly in the winter and spring months, it is liable to sudden and very considerable variations, and a careful study and observation of these is necessary to enable the watchful mariners to anticipate the approach of storms.

The following are the relations which, in Polar latitudes, I have been enabled to trace between the barometer and the weather:—

1. A hard westerly gale, with snow, occasions the greatest depression of the mercury; and a light easterly wind, with dry weather, the greatest elevation.

2. The rising of the mercury foretells the subsidence of wind or rain, a change of wind or fine weather; and its falling, rain, snow, or a change or increase of wind.

3. The mercury rising unusually high, and then becoming stationary, indicates, in the months of April and May, a continuance of fine weather; but in June or July, foggy weather.

4. If, in the month of April, the mercury fall with some rapidity an inch or more, a storm will most certainly succeed, however contrary appearances may be, which will probably be the more severe in proportion as it approximates the east, and will frequently continue, with unabated violence, for fifty or sixty hours.

5. The rising of the mercury usually precedes the cessation of a storm, but does not invariably determine the period of its continuance, as storms frequently blow for a day or two after the first rise of the mercury.

6. Sudden and repeated fluctuations are indicative of unsettled weather; but the rapid fall of the mercury is no indication of a short gale, though, in other regions, the reverse is said to be the case; for, before storms that continue two or three days, the barometer frequently falls an inch within twenty-four hours;

and indeed, in a gale as long and as heavy as I almost ever witnessed, the fall of the mercury was above an inch in twelve hours.

7. Before very heavy storms, when the barometer falls uncommonly low, the mercury seems to get below its natural level, and often rises two or three tenths of an inch as soon as the predicted storm commences; hence this first rise of the mercury is no indication whatever of an abatement of the wind.

8. On account of the different states of the barometer in west and east winds, the usual level of the mercury, with a moderate wind at west, not being much higher than with a gale at east, a change of wind from one of these quarters to the opposite may be accompanied with the greatest alteration in the strength of the wind, without producing any effect on the barometer.

The appearance of the Greenland atmosphere corresponds in some degree with the winter sky of Britain; the colour of the former is, however, of a deeper azure, and its transparency, when clear and free from icy crystals, perhaps more perfect.

Far within the borders of compact ice the atmosphere, in summer, is often cloudless, and the weather serenely pleasant, though cold. But in the usual fishing-stations, and on the exterior of the ice in general, a clear sky is not frequent; nevertheless, when it does occur, its transparency is peculiarly beautiful. The sun sometimes sweeps two or three times round the Pole, without being for a moment obscured by a cloud. Objects the most remote may be seen perfectly distinct and clear. A ship's top-gallant-mast, at the distance of five or six leagues, may be discerned when just appearing above the horizon, with a common perspective glass; and the summits of some mountains are visible at the distance of sixty to a hundred miles. This perfect clearness occurs most frequently before easterly winds; in general, however, especially in very cold weather, objects on the horizon, when viewed with a high magnifier, appear affected with a perpetual tremor; whence the contemplation of distant objects is accomplished as perfectly with a good pocket-glass as with the best telescope. This tremulous motion is evidently produced by the quantity of delicate icy crystals which, in very low temperatures, are almost always seen floating in the air.

The general obscurity of the atmosphere, arising from clouds or fogs, is such, that the sun is frequently invisible during several successive days. At such times, when the sun is near the northern tropic, there is scarcely any sensible variation in the quantity of light from noon to midnight. Hence, when the sailors have been long abroad in the boats, or so fully engaged as to be unable to mark the progress of time, the inquiry, whether it be day or night, is not unfrequent.

There is nothing remarkable in the appearance of the sun at midnight, excepting that, when its altitude is very small, it may be viewed with the naked eye, without producing any painful sensation; but when it is more than four or five degrees above the horizon, it generally appears as effulgent as with the same elevation in Britain. The force of the sun's rays is sometimes remarkable. Where they fall upon the snow-clad surface of the ice or land, they are, in a great measure, reflected, without producing any material elevation of temperature; but when they impinge on the black exterior of a ship, the pitch on one side occasionally becomes fluid, while ice is rapidly generated on the other; or, while a thermometer, placed against the black paint-work on which the sun shines, indicates a temperature of 80° or 90°, or even more, on the opposite side of the ship a cold of 20° is sometimes found to prevail.

This remarkable force of the sun's rays is accompanied with a corresponding intensity of light. A person placed in the centre of a field or other compact body of ice, under a cloudless atmosphere and elevated sun, experiences such an extraordinary intensity of light, that if it be encountered for any length of time, is not only productive of a most painful sensation in the eyes, but sometimes of temporary, or even, as I have heard, of permanent blindness. Under such circumstances, the use of green glasses affords a most agreeable relief. Some of the Indians of North America defend their eyes by the use of a kind of wooden spectacles, having, instead of glasses, a narrow perpendicular slit opposite to each eye. This simple contrivance, which intercepts, perhaps, nine-tenths of the light that would reach a naked eye, prevents any painful consequences in the most intense reflection of light that ever occurs.

The constant light of the sun during the summer prevents the stars from being seen; and this, together with the frequency of cloudy or foggy weather, rarely admits a sight of the moon. Hence, the longitude, which is of such essential importance in navigation, can seldom be determined by lunar observations. Chronometers, therefore, though but little used by the whale-fishers, become of enhanced value; and even a good watch, well regulated, will, where the degrees of longitude are so very contracted, point out the meridianal situation of the ship for short intervals, with a very tolerable degree of accuracy.

Though the air in the arctic seas is generally in a state of dampness, approaching to complete saturation, yet the absolute quantity of moisture cannot, when the cold is very excessive, be considerable. It is remarked, that vessels are less apt to rust here than in any other climate; and this observation, if we consider the relative humidity of the atmosphere as indicated by the hygrometer, is certainly correct;

but though the air in the Polar regions is generally damp, yet it is probable there is no habitable situation in the known world in which such a degree of actual dryness prevails, as in a house or in the cabin of a ship, well heated, when the external air is intensely cold. The wainscoting of the cabin of a ship in cold weather sometimes shrinks, in consequence of the uncommon dryness, as much as half an inch in a panel of about fifteen inches broad, being equal to one-thirtieth of the breadth; but, on returning to Britain, the same panel expands again to almost its original dimensions.

Few observations, comparatively, seem to have been made on the electricity of the atmosphere, especially in high latitudes. Perhaps, some trials that I made in the spring of 1818, on this subject, were the first that have been attempted within the arctic circle. When in latitude 68°, I erected an insulated conductor, eight feet above the maintop-gallant mast-head, connected by a copper wire with a copper ball, attached by a silk string to the deck. The conductor consisted of a slender tapering tube of tinned iron, terminated by a pointed brass wire. It was fixed in an iron socket, supported by a large cylindrical piece of glass; which glass, by means of another iron socket, was secured to the top of a long pole, elevated several feet above the mast-head. A tin cone encompassed the bottom of the conductor, the mouth of which being downward, defended the rod of glass from getting wet, so as to injure its insulated property. The conducting wire, being kept clear of the rigging of the ship, was expected to exhibit in the ball, where it terminated, any difference between the state of the electricity of the ship or sea and that of the atmosphere. The test of electricity was a Bennet's gold-leaf electrometer, brought into contact with the ball; but though trials were made for several successive days, from lat. 78° to lat. 75°, during clear, cloudy, and showery weather, not the least excitation was ever observed. That the effect might be rendered more perceptible, the electrometer was well dried and warmed immediately before each experiment, without which, indeed, no excitation could be produced in it, either with glass or sealing-wax. The nights being light, the aurora borealis could not be seen; but on the evening of the 20th of May, an appearance was observed, very much resembling the aurora borealis, yet no signs of electricity were observed in the electrometer applied to the conductor.

There are several phenomena of the atmosphere dependent on reflection and refraction, deserving of notice. *Ice-blinks* have been already mentioned, when speaking of the ice. Under certain circumstances, all objects seen on the horizon seem to be lifted above it a distance of two to four, or more, minutes of altitude, or so far extended in height above their natural dimensions. Ice, land, ships, boats, and other objects, when thus enlarged and elevated, are said to *loom*. The lower part of *looming* objects are sometimes connected with the sensible horizon by an apparent fibrous or columnar extension of their parts, which columns are always perpendicular to the horizon; at other times, they appear to be quite lifted into the air, a void space being seen between them and the horizon. This phenomenon is observed most frequently on, or before, an easterly wind, and is generally considered as indicative of such.

A most extraordinary appearance of the Foreland, or Charles's Island, Spitzbergen, occurred on the 16th of July, 1814. While sailing to the southward, along the coast, with an easterly wind, I observed what appeared to be a mountain, in the form of a slender, but elevated, monument. I was surprised that I had never seen it before, and was more astonished when I saw, not far distant, a prodigious and perfect arch thrown across a valley, of above a league in breadth. The neighbouring mountains disclosed the cause, by exhibiting an unnatural elevation with the columnar structure of looming objects. Presently, the scene was changed, the mountains along the whole coast assumed the most fantastical forms; the appearance of castles, with lofty spires, towers, and battlements, would, in a few minutes, be converted into a vast arch or romantic bridge.

These varied, and sometimes beautiful, metamorphoses naturally suggested the reality of fairy descriptions; for the air was perfectly transparent; the contrast of snow and rocks was quite distinct; even in the substance of the most uncommon phantasms, though examined with a powerful telescope, and every object deemed to possess every possible stability. I never before observed a phenomenon so varied or so amusing. The land was not alone affected by this peculiar refraction, since every object between the north-east and south-east points of the compass was, more or less, deformed by it. A mass of ice on the horizon appeared of the height of a cliff, and the prismatic structure of its front suggested the idea of basaltic columns. It may be remarked, that these phenomena took place on a clear evening, after an uncommonly warm afternoon.

I observed many other peculiar effects of refraction. Such phenomena are frequent on the commencement or approach of easterly winds, and are probably occasioned by the commixture, near the surface of the land or sea, of two streams of air of different temperatures, so as to occasion an irregular deposition of imperfectly condensed vapour, which, when passing the verge of the horizon, produced these appearances.

Parhelia, mock suns, and *corona*, haloes, are perhaps not so frequent in Greenland as in some parts of America. I do not recollect to have observed them more than thrice. In the first instance, I did not minutely notice the particulars. I recollect, however, there were two or three parhelia, and four or five coloured circles, some of which almost equalled in their colours the brilliancy of the rainbow. On the second occasion, several parhelia were succeeded by a lunar halo, together with the aurora borealis, and proved the harbingers of a tremendous tempest. The last phenomenon of the kind which I saw, consisted of a large circle of luminous whiteness, passing through the centre of the sun, in a direction nearly parallel with the horizon, intersected in various places with coloured circles of smaller dimensions.

Rainbows are common in these regions, but the *fog-bow*, or *fog-circle*, is more rarely observed, and is entitled to our attention. It is a circle depicted on the fog, which prevails in the Polar seas, at certain seasons, resting upon the surface of the water, and seldom reaching to a considerable height. On the 19th July, 1813, I observed one of about 30° diameter, with bands of vivid colours depicted on the fog. The centre of the circle was in a line drawn from the sun, through the point of vision, until it met the visible vapour in a situation exactly opposite to the sun. The lower part of the circle descended beneath my feet to the side of the ship, and although it could not be a hundred feet from the eye, it was perfect, and the colours distinct. The centre of the coloured circle was distinguished by my own shadow, the head of which, enveloped by a halo, was most conspicuously portrayed. I remained a long time contemplating the beautiful phenomencn before me.

In the phenomena of the winds, which I am now about to describe, I cannot be so precise as I have been in my observations on atmospheric temperature and pressure; being able to give a correct idea only of their peculiarities and direction, whilst their relative force, founded on conjecture, I am unable to express otherwise than in the phraseology of the mariner, which, it must be allowed, is somewhat ambiguous.

In proportion as we recede from the equator, we find the winds become more variable, irregular, and partial. Storms and calms, in the northern regions, repeatedly alternate, without warning or progression; forcible winds blow at one place, when, at the distance of a few leagues, gentle breezes prevail; a storm from the south, on one hand, exhausts its impetuosity upon the gentle breeze, blowing from off the ice on the other, without prevailing in the least; ships, within the circle of the horizon, may be seen enduring every variety of wind and weather at the same moment; some becalmed, and tossing about by the violence of the waves; some, under close-reefed topsails, labouring under the force of a storm; and others, flying under gentle breezes, from quarters as diverse as the cardinal points.

The most general preliminaries to *sudden storms* are perfect calms; curiously variable breezes, with strong squalls; singular agitation of the sea, together with thick snow, which often changes from flakes to powder, and falls in such profusion, as to occasion an astonishing gloominess and obscurity in the atmosphere. If the snow clear away, the gale is often at hand, whilst a luminousness on the horizon, resembling the ice-blink, sometimes points out its direction, and a noise in the upper regions of the air announces its immediate approach. In this variable and occasionally tempestuous climate, the value of the barometer is satisfactorily proved. My father once removed his ship from a most dangerous bight in the main ice, where she would probably have been lost, had she remained a few moments longer, in consequence of his having heard the rushing of a storm in the air, while at the mast-head. Before the ship was out of danger, a heavy gale commenced, but the sails being set, and the ship under command, she was extricated from the perilous situation. From this circumstance, he imagined that sudden storms frequently commence at some height in the atmosphere, and gradually descend to the surface. *Intermitting gales* are almost equally common with sudden storms, and variable winds prevail, in an extraordinary degree, in the frigid zone. The winds, indeed, among ice, are generally unsteady in their direction, and attended with strong gusts or squalls, particularly in very cold weather, and towards the termination of a storm. This variableness, being the effect of the unequal temperature of the ice and water, is curious, but the phenomenon that is most calculated to excite surprise is, that several distinct, and even opposite winds, with the force, in many instances, of a fresh gale, will occasionally prevail at the same moment of time, within the range of the horizon. The situation in which this circumstance occurs, would appear to be the point where conflicting winds contend for the superiority; and as, in some instances, their forces are effectually balanced, the winds, which simultaneously blow from the southward and northward, or from the eastward and westward, have their energies almost destroyed at the place of combination. Thus it sometimes happens that ships, within sight of each other, will, at the same period of time, experience every variety of weather, from calm to storm, from fair weather to thickest snow, together with several distinct and contrary currents of wind.

On the morning of the 30th of April, 1810, the ship Resolution—in which I served in the capacity of chief mate, or harpooner—was, during thick showers of snow, sailing by the edge of a stream of ice, with the wind from the north-westward. About ten, A. M., the snow abated, and several ships were seen within the distance of three or four miles. As all of these ships were sailing " on a wind," it was easy to ascertain the direction of the wind where they were, and curious to observe its variableness. Two ships, bearing north-east from us, had the wind at north-east; two, bearing east, had east or east-north-east; two, bearing south-east, had the wind at south-east; while, with us, it blew from the north-west. In each of these situations a fresh breeze prevailed; but in some situations, where there happened to be no ships, there appeared to be no wind at all. The clouds above us, at the time, were constantly changing their forms. Showers of snow were seen in various places at a distance.

Instances of *local storms* are not uncommon in temperate climates, but in the arctic regions they are frequent and striking. Their locality is such, that a calm may occur when a storm is expected and actually does prevail at a short distance, so that the indication of the barometer may appear to be erroneous. In such cases, however, the reality of the storm is often proved by the agitation of the sea. Swells from various quarters make their appearance, and frequently prevail at the same time. My father, whose opportunities of observation have been very numerous, relates the following instance of the locality of a storm. When commanding the ship Henrietta, he was on one occasion navigating the Greenland Sea during a tedious gale of wind, accompanied with snowy weather. As the wind began to abate, a ship appeared in sight, under all sails, and presently came up with the Henrietta. The master hailed, and inquired what had happened that my father's ship was under close-reefed top-sail in such moderate weather. On being told that a storm had just subsided, he declared that he knew nothing of it; he observed, indeed, a swell, and noticed a black cloud a-head of his ship that seemed to advance before him until he was overshadowed with it a little while before he overtook the Henrietta, but he had had fine weather and light winds the whole day!

A single instance is given of those sudden gusts and various currents of wind, which occur at some elevation in the atmosphere, and which are common to all climates. On a particularly fine day, my father having landed on the northern part of Charles's island, incited by the same curiosity which led him on shore, ascended, though not without great difficulty and fatigue, a considerable elevation, the summit of which was not broader than a common table, and which shelved on one side as steep as the roof of a house, and on the other formed a mural precipice. Engaged in admiring the extensive prospect from an eminence of about two thousand feet, he scarcely noticed the advance of a very small cloud. Its rapid approach and peculiar form (having somewhat the appearance of a hand) at length excited his attention, and when it reached the place where he was seated in a calm air, a torrent of wind assailed him with such violence, that he was obliged to throw himself on his body and stick his hands and feet in the snow to prevent himself from being hurled over the tremendous slope which threatened his instant destruction. The cloud having passed, the air, to his great satisfaction, became calm, when he immediately descended by sliding down the surface of snow, and in a few minutes reached the base of the mountain in safety.

The course of the seasons, as relates to prevailing winds, is as follows. In the spring months, north-east and east winds are frequent, with severe storms from these and other quarters. The storms from the north-east, east, and south-east, are generally the most violent. When they occur in March and April, they frequently continue without intermission for two or three successive days, and rarely subside till the wind veers round to the north or north-west. Storms, in the spring of the year, blowing from the south-east, generally change, before they abate, to the east, north-east, north, and north-west; but storms commencing at south-west or south, usually veer, before they subside, in the contrary direction, towards the north-west, and sometimes continue changing until their strength is spent in the north or north-east quarter. A storm beginning to blow from the western quarter seldom continues long; when it blows hard it commonly veers to the north or north-east, and it is observable that a very hard southerly or easterly gale is frequently succeeded within a few days by another from the opposite quarter. With the advance of the month of May, storms become less frequent, and the weather becomes sensibly better. The winds then begin to blow more frequently from the north-west; in June, the most common winds are north and north-west, south and south-west; and in July, south and south-westerly winds prevail. At this season, calms or very light winds also become frequent, and continue sometimes for several days together. In high northern latitudes, however, very heavy storms from the southward occur in July, and blow for thirty or forty hours at a time. In August, north-east winds begin again to prevail. The south-west and southerly storms of the autumn blow with particular violence. "The wind rages so vehemently, that the houses quiver and crack, the tents and lighter boats fly up in the air, and the sea-water scatters about in the land like snow-dust—nay, the Greenlanders say that the storm rends off stones a couple of pounds' weight, and mounts them in the air. In summer, whirlwinds also spring up, that draw up the waters out of the sea, and turn a boat round several times."

When the countries of temperate climates suffer under tempests in frequent succession, Polar regions enjoy comparative tranquillity. After the autumn gales have passed, a series of calm weather, attended by severe frosts, frequently succeeds. So striking, indeed, is the stillness of the northern winter, that there is truth in Dr. Guthrie's observation, that nature seems "to have studied perfect equality in the distribution of her favours, as it is only parts of the earth which most enjoy the kindly influences of the sun that suffer by the effects of its superior heat, so that if the atmosphere of the north is not so genial as that of the south, at least it remains perfectly quiet and serene, without threatening destruction to man and the product of his industry as in what are called happier climates."

The principal meteors, not being of the aqueous kind, that remain to be considered are lightning and the aurora borealis. As we approach the Pole, the former phenomenon becomes more rare, and the latter more common. Lightning, indeed, is seldom seen to the northward of the arctic circle, and when it does occur, it is very seldom accompanied by thunder.

In Spitzbergen, neither thunder nor lightning has, I believe, ever been observed. For my own part, I have never seen lightning northward of latitude 65°, and only in two instances when at any considerable distance from land. The aurora borealis occurs independent of land and of cold, becoming more frequent in its appearance as we approach the Pole, and enlivening by its brilliancy and peculiar grandeur the tedious gloom of the long winter nights. Its appearance, though not very frequently seen in Britain, is very common as far south as Shetland and Feroe. In Iceland, and other countries bordering on the arctic circle, the northern lights occur almost every clear night during the winter. In the summer, they can seldom be seen on account of the presence of the sun, and in the spring of the year, the obscurity of the atmosphere prevents their frequent exhibition. In several instances, I have known stormy weather follow the appearance of the brilliant aurora, and one of the most tremendous storms I was ever exposed to, succeeded a splendid exhibition of the northern lights. Under certain circumstances, especially when they are seen at a considerable altitude above the horizon, having a red or copper colour, they are supposed to be indicative of a violent storm.

Our chapter on atmospherical phenomena must now be concluded by observations on aqueous meteors; including clouds, rain, hail, snow, frost-rime, hoar-frost, and fog.

Very little clear weather occurs in the Greenland seas, for often when the atmosphere is free from any visible vapour on the land, at sea it is obscured by frost-rime in the spring of the year, and by clouds or fog in the summer; so that scarcely one-twentieth of the season devoted to the whale-fishery can be said to consist of clear weather.

The *clouds* most generally consist of a dense stratum of obscurity, composed of irregular compact patches covering the whole expanse of the heavens. The *cirrus*, *cirrocumulus*, and *cirrostratus*, of Howard's nomenclature, are occasionally distinct; the *nimbus* is partly formed, but never complete: and the grandeur of the *cumulus* or thunder-cloud is never seen, unless it be on the land. In the atmosphere over the coasts in Greenland and Spitzbergen, where the air is greatly warmed by the concentration and reflection of the sun's rays in the sheltered valleys, a small imperfect cumulus is sometimes exhibited.

The known agents made use of in the economy of nature for the production of rain are changes of temperature and electricity. The latter principle is supposed to act most powerfully in the production of thunder-showers, in which case it is not unlikely that a portion of the air of the atmosphere is, by the passing of the lightning from one cloud to another, converted into water. The former seems to be the chief agent in the colder regions of the globe, where electricity is either more equal in its distribution, or not so active in its operations as in the warmer climates. From the beautiful theory of the late Dr. James Hutton, supported by the researches of professor Leslie, it appears, that "while the temperature advances uniformly in arithmetical progression, the dissolving power which this communicates to the air mounts with the accelerating rapidity of a geometrical series;" and this in such a ratio, that the "air has its dryness doubled at each rise of temperature answering to fifteen centesimal degrees," or twenty-seven of Fahrenheit. Hence, "whatever be the actual condition of a mass of air, there must always exist some temperature at which it would become perfectly damp;" and hence whenever two streams of air saturated with moisture of different temperatures are mixed together, or brush against one another, in the form of different currents of wind, there must always be a quantity of moisture precipitated. For if two masses of air, of different temperatures, but equal in quantity, and both saturated with moisture, were mixed together, the resulting temperature would be nearly the mean of the two, but, at that temperature, the capacity of air for moisture being less than the quantity contained in the two commixed masses, the surplus must be deposited.

Rain is by no means common in the Polar countries excepting in the months of July and August, and then only with southerly or westerly winds. During all seasons of the year, however, with strong gales blowing from a southern climate, rain is occasionally observed in situations near the edge of the ice; but snow or sleet are more common even under such circumstances; and in remote situations among ice, near the 80th parallel of latitude, rain seldom or never occurs.

Hail is a much more familiar meteor in temperate than in frigid climates. In the Greenland Sea, this aqueous concretion is very rarely seen; and if we define it as consisting of pellucid spher es of ice, generated in the atmosphere, it may be said to be unknown in very high latitudes. This fact is in favour of the electrical origin of hail, as it is well known to be common in temperate climates, where the air is in a high state of electricity, and to be the frequent concomitant of thunder and lightning. The only substance resembling hail that is generated in the frigid zone consists of a white, porous, spherical concretion of light and snowy texture.

Snow is so very common in the arctic regions, that it may be boldly stated, that in nine days out of ten, in April, May, and June, more or less snow falls. With southerly winds, near the borders of the ice, or in situations where humid air, blowing from the sea, assimilates with a gelid breeze from the ice, the heaviest falls of snow occur. In this case, a depth of two or three inches is sometimes deposited in an hour. The thickest precipitations also frequently precede sudden storms. The form of the particles of snow presents an endless variety. When the temperature of the air is within a degree or two of the freezing point, much snow falls, frequently consisting of large irregular flakes, such as are common in Britain. Sometimes it exhibits small granular, or large rough white concretions; at others, it consists of white spiculæ, or rude stellated crystals. But in severe frosts, though the sky appears perfectly clear, lamellar flakes of snow, of the most regular and beautiful forms, are always seen floating in the air, and sparkling in the sunbeams, and the snow which falls in general is of most elegant texture and appearance.

Snow, of a reddish or brownish colour, is not unfrequently seen. The brownish stain, which occurs on shore, is given by an earthy substance brought from the mountains by the streams of water, derived from thawing ice and snow, or the fall of rain. The reddish colour, as far as I have observed, is given by the mute of birds ; though, in the example met with by captain Ross, in Baffin's Bay, the stain appears to have been of a vegetable nature. The little auk, (*Alca alle*,) which feeds upon shrimps, is found, in some parts of the Polar seas, in immense numbers. They frequently retreat to pieces of ice, or surfaces of snow, and stain them all over red with their mute. Martens saw red snow in Spitzbergen, which he considered as being stained by rain-water running down by the rocks.

The extreme beauty and endless variety of the microscopic objects procured in the animal and vegetable kingdoms, are perhaps fully equalled, if not surpassed, in both particulars of beauty and variety, by the crystals of snow. The principal configurations are the stelliform and hexagonal, though almost every shape, of which the generating angles of 60° and 12° are susceptible, may, in the course of a few years' observation, be discovered. The various modifications of crystals may be classed under five general kinds, or genera.

1. *Lamellar*, infinite in variety, most delicate in structure, and capable of sub-division into several distinct species.

2. *A lamellar, or spherical nucleus, with spinous ramifications in different planes.* This genus also consists of two or three species.

3. *Fine spiculæ, or six-sided prisms.* The finest specimens resemble white hair, cut into lengths not exceeding a quarter of an inch.

4. *Hexagonal pyramids.* I have but once seen this kind of snow crystal.

5. *Spiculæ, or prisms having one or both extremities inserted in the centre of a lamellar crystal.* This genus resembles a pair of wheels, united by an axle-tree.

In low temperatures, the greatest proportion of crystals that fall are, probably, perfect geometrical figures.

Some of the general varieties in the figures of the crystals may be referred to the temperature of the air; but the particular and endless modifications of similar classes of crystals can only be referred to the pleasure of the great First Cause, whose works, even the most minute and evanescent, and in regions the most remote from human observation, bear the impress of His own hand, and display to his intelligent creatures his vast and beneficent wisdom. If, on these forms of unintelligent matter, he has bestowed such excellent workmanship, with how much more transcendent loveliness will he clothe those who are redeemed by the exceeding riches of his grace, and who, beyond the history and productions of all worlds, will reflect the beauty of his glorious countenance!

Frost-rime, or frost-smoke, is a meteor peculiar to those parts of the globe where a very low temperature prevails for a considerable time. It consists of a dense frozen vapour, apparently arising out of the sea, or any large sheet of water, and ascending, in high winds and turbulent seas, to the height of eighty or one hundred feet, but, in light breezes and smooth water, creeping along the surface. The particles of which it consists are as small as dust, and cleave to the rigging of ships, or almost any substance against which they are driven by the wind, and afford a coating of an inch or upwards in depth. These particles adhere to one another until the windward surface of the ropes is covered, and form long fibres somewhat of a prismatical or pyramidal shape, having their points directed towards the wind. Frost-rime adheres readily to articles of clothing; and, from the circumstance of its lodging in the hair, and giving it the appearance of being powdered, the sailors humorously style it "the barber." Such of the frost-rime as is dislodged from the rigging whenever the ship is tacked, covers the deck to a considerable thickness, and, when trod upon, emits an acute sound, resembling the crushing of fine particles of glass. The cause of this phenomenon, which generally is not observed until the cold is reduced to 14°, may perhaps be similar to that producing rain, and may be explained according to Dr. Hutton's theory.

An aqueous vapour, consisting of very minute frozen particles, sometimes occupies the lower regions of the atmosphere in temperate and frigid climates, during frosty weather, and is deposited on the ground, on surfaces of ice, or almost any other substance with which it comes in contact. This vapour seems to be of the nature of *hoar-frost;* it generally appears in the evening, after a bright sunshiny day.

Fog, or mist, is the last meteor that remains to be considered. This is one of the greatest annoyances that the arctic whalers have to encounter. It frequently prevails during the greater part of the month of July, and sometimes, at considerable intervals, in June and August. Its density is often such, that it circumscribes the prospect to an area of a few acres, not being pervious to sight at the distance of a hundred yards. It frequently lies so low that the brightness of the sun is scarcely at all intercepted ; in such cases, substances warmed by the sun's rays, give to the air immediately above them increased capacity for moisture, by which evaporation goes briskly on during the densest fogs. In Newfoundland, on occasions when the sun's rays penetrate the mist, and heat the surface of the rocks, fish is frequently dried during the thickest fogs. Fogs are more frequent and more dense at the borders of the ice than near the coast of Spitzbergen. They occur principally when the mercury, in the thermometer, is near the freezing point, but they are by no means uncommon with the temperature of 40° or 45°. They are most general with south-westerly, southerly, and south-easterly winds. They seldom occur with high winds, yet in one or two instances I have observed them very thick, even in storms. Rain generally disperses them. Fogs, by increasing the apparent distances of objects, appear sometimes to magnify men into giants, hummocks of ice into mountains, and common pieces of drift-ice into heavy floes or bergs. They are an especial annoyance to the whale-fisher, and greatly perplex the navigator, by preventing him from obtaining observations for the correction of his latitude and longitude, so that he often sails in complete uncertainty. Fogs are more common near the ice than in the vicinity of the land, more frequent in open seasons than in close seasons, and more intense and more common in the southern fishing-stations than in the most northern.

CHAPTER V.

A SKETCH OF THE ZOOLOGY OF THE ARCTIC REGIONS.

In the arrangement of the following original observations on, and descriptions of the more remarkable animals inhabiting, or frequenting, Spitzbergen and the adjacent seas, I have followed Linnæus, in combination with La Cepède. The latter author has published a most voluminous and pleasing account of cetaceous animals, and has made some judicious changes in the Linnæan arrangements. By La Cepède, for instance, whales having the dorsal fin are separated from those without it; the former being called, in distinction from the latter, *Balænopteræ*, signifying whales with a fin.

Our first description must relate to the animals of the *cetaceous kind*, which frequent the Greenland Seas.

Of these the first in eminence and of importance to our commerce, is the *Balæna mysticetus*, the common or Greenland whale. This animal is productive of more oil than any other of the cetacea, and being less active, slower in its motion, and more timid than any other of its kind, of similar, or nearly similar, magnitude, it is more easily captured. Its size has been much overrated, and, in his excellent natural history of cetaceous animals, La Cepède has been guilty of considerable exaggeration. In the age when whales were regarded with superstitious dread, it is easy to conceive that the dimensions of an animal inhabiting an element in which it cannot easily be measured, would be recorded with extravagance. Authors of the first respectability in the present day give a length of eighty to one hundred feet to the mysticetus, and remark with unqualified assertion, that when the captures were less frequent, and the animals had sufficient time to attain their full growth, specimens were found of one hundred and fifty to two hundred feet in length, or even longer; and some ancient naturalists, indeed, have gone so far as to assert, that whales had been seen of above nine hundred feet in length. In the present day, however, it is certain that they are by no means so bulky. Of three hundred and twenty-two individuals, in the capture of which I have been personally concerned, no one, I believe, exceeded sixty feet in length, and the largest I ever measured was fifty-eight feet, from one extremity to the other, being one of the largest to appearance which I ever saw. An uncommon whale that was caught near Spitzbergen, about twenty years ago, the whalebone of which measured almost fifteen feet, was not, I understand, so much as seventy feet in length; and the longest actual measurement that I have met with, or heard of, is given by sir Charles Giesecké, who informs us, that in the spring of 1813, a whale was killed at Godhaven of the length of sixty-seven feet. These, however, are very uncommon instances. I therefore conceive that sixty feet may be considered as the size of the larger animals of this species, and sixty-five feet in length as a magnitude which very rarely occurs.

I believe, too, that whales are now met with of as large dimensions as at any former period since the commencement of the whale-fishery; a point which, I think, can be established from various historical records.

The greatest circumference of the whale is from thirty to forty feet. It is thickest a little behind the fins, or in the middle, between the anterior and posterior extremes of the animal, from whence it gradually tapers in a conical form towards the tail, and slightly towards the head. Its form is cylindrical, from the neck to within ten feet of the tail, beyond which it becomes somewhat quadrangular, the greatest ridge being upward, or on the back, and running backward nearly across the middle of the tail. The head has somewhat of a triangular shape. The under-part, the arched outline of which is given by the jaw-bones, is flat, and measures sixteen to twenty feet in length, and ten to twelve in breadth. The lips, extending fifteen or twenty feet in length, and five or six in height, and forming the cavity of the mouth, are attached to the under-jaw, and rise from the jaw-bones at an angle of about 80°, having the appearance, when viewed in front, of the letter U. The upper-jaw, including the "crown-bone," or skull, is bent down at the extremity, so as to shut the front and upper parts of the cavity of the mouth, and is overlapped by the lips in a squamous manner at the sides.

When the mouth is open, it presents a cavity as large as a room, and capable of containing a merchant-ship's jolly-boat full of men, being six or eight feet wide, ten or twelve feet high in front, and fifteen or sixteen feet long. The fins, two in number, are placed between one-third and two-fifths of the length of the animal, from the snout, and about two feet behind the angle of the mouth. They are seven to nine feet in length, and four or five in breadth; and in the living animal are capable of considerable flexion. The whale has no dorsal fin.

The tail, comprising in a single surface eighty or one hundred square feet, is a formidable instrument of motion or defence. Its length is only five or six feet, but its width is eighteen to twenty-four or twenty-six feet. Its position is horizontal. In its form it is flat and semi-lunar, indented in the middle, the two lobes somewhat pointed and turned a little backward. Its motions are rapid and universal; its strength immense.

The eyes are situated in the sides of the head, about a foot obliquely above and behind the angle of the mouth. They are little larger than those of an ox. The whale has no external ear. The spiracles or nostrils of the whale are two longitudinal apertures, six or eight inches in length, from which a moist vapour, mixed with mucous, is discharged when the animal breathes, but no water accompanies it unless the breathing takes place under the surface. The mouth, in place of teeth, contains two extensive rows of "fins," or whalebone, which are suspended from the sides of the crown-bone. Each series, or side of bone, as the whale-fishers term it, consists of upwards of three hundred laminæ, of which the longest are near the middle. Ten or eleven feet is the average length, and the greatest breadth at the gum ten or twelve inches. The interior edges of these laminæ are covered with a fringe of hair. In the youngest whales, called suckers, the whalebone is only a few inches long; when the length reaches six feet or upwards, the whale is said to be of *size.* The colour of the whalebone is brownish black, or bluish black, and occasionally striped longitudinally with white. A large whale sometimes affords a ton and a half of whalebone. The gum, in which the thick ends of the whalebone are inserted, is white, fibrous, tender, and tasteless. It cuts like cheese, and has the appearance of the kernel of the cocoa-nut. The animal has a large tongue, a slight beard, and a remarkably narrow throat.

The milk of the whale resembles that of quadrupeds in appearance, and is said to be rich and well-flavoured. In the female, two paps are situated on the abdomen.

The colour of the mysticetus is velvet black, grey, and white, with a tinge of yellow, according to the parts of the body. The older animals contain the most grey and white; under-sized whales are altogether of a bluish black, and suckers of a pale bluish, or bluish grey colour.

The skin of the body is slightly furrowed, but on the tail it is smooth. That part of the skin, which can be pulled off in sheets after it has been dried a little in the air, or particularly in the frost, is not thicker than parchment. The *rete mucosum* in adults is about three-fourths of an inch in thickness over most parts of the body. Under it lies the true skin, white and tough, and immediately in contact with it the blubber.

This most valuable portion of the animal encompasses its whole body. Its colour is yellowish white, yellow, or red; in old animals sometimes resembling the substance of the salmon. It swims in water. Its thickness all round the body is eight or ten to twenty inches, varying in different parts, as well as in different individuals. The lips are composed almost entirely of blubber, and yield from one to two tons of pure oil each. The oil appears retained in the blubber in minute cells, connected by a strong reticulated combination of tendinous fibres, which are condensed at the surface, and appears to form the substance of the skin. The oil is expelled when heated. In its fresh state, the blubber is without unpleasant smell, and it is only at the end of the voyage that the cargo of a Greenland ship becomes disagreeable.

The quantity of oil yielded by a certain quantity of blubber varies according to the age of the animal; the blubber of the sucker contains a very small portion. The quantity of oil generally bears a proportion to the length of the longest blade of whalebone. Four tons of blubber in measure generally produce three tons of oil; the ton of oil being two hundred and fifty-two gallons, wine-measure.

The flesh of the young whale is of a red colour, and, when broiled and seasoned with pepper and salt, eats like coarse beef. The bones are very porous, and contain much fine oil. The ribs are thirteen in number, and are nearly solid, and the bones of the fins, in number and proportion, are similar to those of the fingers of the human hand.

A stout whale, of sixty feet in length, is of the enormous weight of seventy tons; the blubber weighs about thirty tons; the bones of the head, whalebone, fins, and tail, eight or ten; the carcase thirty or thirty-two.

The whale is dull of hearing, but its sense of seeing is acute, especially when under water. It has no voice, but makes in breathing or blowing a very loud noise. It blows or breathes about four or five times a minute, discharging vapour to the height of some yards, which, at a distance, looks like a puff of smoke. When the animal is wounded, this vapour is often stained with blood, and on the approach of death jets of blood are sometimes discharged. The whale being lighter than the water, can remain at the surface with ease, but requires considerable exertion to descend. It advances through the water by means of the tail, which, to attain the greatest velocity, is moved alternately upward and downward; and, for slower progress, laterally and obliquely downward, in the manner of *skulling* a boat. The fins are used for balancing the animal, and in bearing off their young. I have observed a whale descending, after I had harpooned it, to the depth of four hundred fathoms, with the average velocity of seven or eight miles per hour. The usual rate at which whales swim, however, seldom exceeds four miles an hour, and though their extreme velocity may be eight or nine, yet we find this speed never continues longer than for a few minutes. They sometimes ascend with such rapidity as to leap entirely out of the water, apparently for amusement, and to the high admiration of the distant spectator. At other times they throw themselves into a perpendicular posture, with their heads downward, and rearing their tails on high in the air, they beat the water with awful violence; the sea is thrown into foam, the air is filled with vapours, and the noise in calm weather is heard to a great distance. Sometimes the whale shakes its tremendous tail in the air, which, cracking like a whip, resounds to the distance of two or three miles.

When it retires from the surface, it first lifts its head, then plunging it under water, elevates its back, like the segment of a sphere, deliberately rounds it away towards the extremity, throws its tail out of the water, and then disappears. Whales usually remain at the surface to breathe about two minutes, during which time they "blow" eight or nine times, and then descend for an interval usually of five or ten minutes, but sometimes, when feeding, fifteen or twenty. They commonly descend to only a trifling depth; but, when struck, they have been known, by the quantity of line taken out of the boat, to descend to the depth of an English mile, and, with such velocity, as to break their jaw-bones by the blow struck against the bottom. Occasionally, they may be found sleeping in calm weather among ice, and some persons are of opinion that, when undisturbed, they can remain under the surface for many hours at a time.

The food of the whale consists of various species of *actiniæ*, *cliones*, *sepiæ*, *medusæ*, *cancri*, and *helices*, judging from the fact that some of these genera are always to be seen wherever any tribe of whales is found stationary. I have only discovered in the stomachs of dead animals *squillæ* or shrimps. When the whale feeds, it swims swiftly through the sea, with its jaws extended ; its food is entangled by the whalebone, which, from its compact arrangement and thick internal covering of hair, does not allow a particle to escape.

The whale has one young at a birth. At this time the young one is said to be at least ten feet long, and continues under the protection of the mother for probably a year, until, by the growth of the whalebone, it is able to maintain itself. It probably reaches the magnitude called *size*, that is, with a six feet length of whalebone, in twelve years, and attains its full growth at the age of twenty or twenty-five. Whales live to a great age. The maternal affection of the whale is very interesting. The cub, being insensible to danger, is easily harpooned, and is sometimes struck as a snare to secure the mother. In this case she joins it at the surface whenever it has occasion to rise for respiration, encourages it to swim off, assists its flight by taking it under her fin, and seldom deserts it while life remains. In

June, 1811, one of my harpooners struck a sucker, with the hope of its leading to the capture of the mother. Presently she arose close by "the fast-boat," and seizing the young one, dragged about a hundred fathoms of line out of the boat with remarkable force and velocity. Again she rose to the surface, darted furiously to and fro, frequently stopped short, or suddenly changed her direction, and gave every possible intimation of extreme agony. For a length of time she continued thus to act, though closely pursued by the boats; and, inspired with courage and resolution by her concern for her offspring, seemed regardless of the danger which surrounded her. At length, one of the boats approached so near that a harpoon was hove at her. It hit, but did not attach itself. A second harpoon was struck, this also failed to penetrate, but a third was more effectual, and held. Still she did not attempt to escape, but allowed other boats to approach, so that, in a few minutes, three more harpoons were fastened, and, in the course of an hour afterwards she was killed.

There is something deeply interesting in the manner in which the great Maker of all things, in giving laws to the animal kingdom, has thus presented so many illustrations of the parental relation. It is as if he would not leave his intelligent creatures destitute of memorials of their relation to himself; so that, while in the field and on the flood, they behold the signs of parental affection and filial dependence, they may be led to ponder the solemn question of their tender and faithful Parent in heaven —"If, then, I be a Father, where is mine honour ?"

The mysticetus occurs most abundantly in the frozen seas of Greenland and Davis's Strait, in the bays of Baffin and Hudson, in the sea to the northward of Behring's Strait, and along some part of the northern shores of Asia, and probably America. It is never met with in the German Ocean, and rarely within two hundred leagues of the British coast; but along the coasts of Africa and South America it is met with periodically, in considerable numbers. In these regions, it is attacked and captured by the southern British and American whalers, as well as by some of the people inhabiting the coasts to which it resorts. Whether this whale is precisely of the same kind as that of Spitzbergen and Greenland is uncertain, though it is evidently a mysticetus. One striking difference, possibly the effect of situation and climate, is, that the mysticetus in southern regions is often covered with barnacles, while those of the Arctic Seas are free from these shell-fish.

Besides the formidable inroads made upon the whale by man, it is subject to annoyance from sharks, and it is also said from the narwal, sword-fish, and thrasher. The opinion as to the narwal I am persuaded is incorrect; the sword-fish and thrasher (if such an animal there be) may be enemies of the whale, and the shark certainly is hostile to the extent of his ability, which, in comparison to that of the whale, can hardly be very formidable.

It is certain that the flesh of the whale is now eaten by savage nations, and it is also well authenticated that, in the twelfth, thirteenth, fourteenth, and fifteenth centuries, it was used as food by the Icelanders, the Netherlanders, the French, the Spaniards, and, probably, by the English. Besides forming a choice eatable, the inferior products of the whale are applied to other purposes by the Indians and Esquimaux of Arctic countries, and, with some nations, are essential to their comfort. Some membranes of the abdomen are used for an upper article of clothing, and the peritoneum in particular, being thin and transparent, is used instead of glass in the windows of their huts; the bones are converted into harpoons and spears for striking the seal, or darting at the sea-birds, and are also employed in the erection of their tents, and, with some tribes, in the formation of their boats; the sinews are divided into filaments, and used as thread, with which they join the seams of their boats and tent-cloths, and sew, with great taste and nicety, the different articles of dress they manufacture; and the whalebone and other superior products, so valuable in European markets, have also their uses among them.

The largest animal of the whale tribe is not the mysticetus, but the *Balæna physalis* of Linnæus, *Balænoptera gibbar* of La Cepède, and razor-back of the whalers. This is, probably, the most powerful and bulky of created beings. In comparison with the mysticetus, it has a form less cylindrical, a body longer and more slender, whalebone shorter, produce in blubber and oil less, colour bluer, fins more numerous, breathing more violent, speed greater, and actions quicker, more restless and more bold. Its length is about one hundred feet, and its greatest circumference thirty or thirty-five. Its colour is a pale bluish black, or dark bluish grey, in which it resembles the sucking mysticetus. Besides the two pectoral fins, it has a small horny protuberance, or rayless and immovable fin on the extremity of the back. Its greatest velocity in swimming is about twelve miles an hour. It is by no means a timid animal, yet it does not appear revengeful or mischievous. When closely pursued by boats, it manifests little fear, and does not attempt to outstrip them in the race, but merely endeavours to avoid them by diving or changing its direction. If harpooned, or wounded, it then exerts all its energies, and escapes with its utmost velocity, but shows little disposition to retaliate on its enemies, or to repel their attacks by engaging in a combat. Unlike the mysticetus, it very rarely, when descending into the water, throws its tail into the air. Its great speed and activity render it a difficult and dangerous object of attack, and the small quantity of inferior oil it affords makes it unworthy the general attention of the fishers. When struck, it not uncommonly drags the fast-boat with such speed through the water, that it is liable to be carried immediately beyond the reach of assistance, and soon out of sight of both boats and ship. Hence the striker is under the necessity of cutting the line, and sacrificing his employer's property for securing the safety of himself and his companions. In the year 1818, I ordered a general chase of them, providing against the danger of having my crew separated from the ship by appointing a rendezvous on the shore not far distant, and preparing against the loss of much line by dividing it at two hundred fathoms from the harpoon, and affixing a buoy to the end of it. Thus arranged, one of these whales was shot, and another struck. The former dived with such impetuosity that the line was broken by the resistance of the buoy, as soon as it was thrown into the water, and the latter was liberated within a minute by the division of the line, occasioned, it was supposed, by its friction against the dorsal fin. Both of them escaped. Another physalis was struck by one of my inexperienced harpooners, who mistook it for a mysticetus. It dived obliquely with such velocity that four hundred and eighty fathoms of line were withdrawn from the boat in about a minute of time.

This whale was also lost by the breaking of the line.

The physalis occurs in great numbers in the Arctic Seas, especially along the edge of the ice, between Cherie Island and Nova Zembla, and also near Jan Mayen. Persons trading to Archangel have often mistaken it for the common whale. It is seldom seen among much ice, and seems to be avoided by the mysticetus; hence the fishers view it with painful concern. It inhabits most generally in the Spitzbergen quarter the parallels of 70° to 76°; but in the months of June, July, and August, when the sea is usually open, it advances along the land to the northward as high as 80° of latitude. In open seasons it is seen near the headland at an earlier period. A whale, probably of this kind, one hundred and one feet in length, was stranded on the banks of the Humber, about the middle of September, 1750.

Another species of whale frequenting the coasts of Scotland, Ireland, Norway, etc., is the *Balænoptera rorqual* of La Cepède, *Balæna musculus* of Linnæus, or the broad-nosed whale.

In many characters, this species resembles the physalis, though, I think, with an essential difference. The musculus is shorter, having a larger head and mouth, and a rounder under-jaw than the physalis and is said to feed principally upon herrings. Several individuals, apparently of this kind, have been stranded or killed on different parts of the coast of the

United Kingdom. One was embayed and killed in Balta Sound, Shetland, in the winter of 1817-18, some remains of which I saw. It was eighty-two feet in length, the jaw-bones were twenty-one feet long, and the largest lamina of whalebone about three feet. Instead of hair at the inner edge, and at the point of each blade of whalebone, it had a fringe of bristly fibres, and it was stiffer, harder, and more horny in its texture than common whalebone. It produced only about five tons of oil, all of it of an inferior quality; some of it viscid and bad. It valued, deducting expenses, no more than £60 sterling. It had the usual sulci about the thorax, and a dorsal fin.

A smaller species of whale is *Balænoptera jubartes* of La Cepède, *Balæna boops* of Linnæus, or the finner of the whale-fishers.

The following is its description:—Length, about forty-six feet; greatest circumference of the body, about twenty feet; dorsal protuberance, or fin, about two feet and a half high; pectoral fins, four or five feet long externally, and scarcely a foot broad; tail, about three feet deep and ten broad; whalebone, about three hundred laminæ on each side, the longest about eighteen inches in length, the under-jaw about fifteen feet long, or one-third of the whole length of the animal; sulci, about two dozen in number; two external blow-holes; blubber on the body two or three inches thick, under the sulci none.

The last, and smallest of the whalebone whales, with which I am acquainted, is the *Balænoptera acuto-rostrata* of La Cèpede, *Balæna rostrata* of Linnæus, or the beaked whale. An animal of this kind was killed in Scalpa Bay, November 14, 1808. Its length was seventeen and a half feet, circumference twenty. Pectoral fins, two feet long and seven inches broad; dorsal fin fifteen inches long by four and a half feet broad. Largest whalebone, about six inches. The rostrata is said to inhabit principally the Norwegian Seas, and to grow to the length of twenty-five feet. One of the species was killed near Spitzbergen, in 1813, and I have some of the whalebone in my possession.

Three species of narwals are noticed by La Cepède, though I myself have seen but one, and perhaps the other species are imaginary, for the animal varies in appearance. It is the *Monodon monoceros* of Linnæus, and the narwal, or unicorn, of whalers.

It is, when full grown, from thirteen to sixteen feet in length, exclusive of the tusk; and in circumference (two feet behind the fins, where it is thickest,) eight to nine feet. The form of the head, with the part of the body before the fins, is paraboloidal; of the middle of the body, nearly cylindrical; of the hinder-part, to within two or three feet of tail, somewhat conical, and from thence a ridge, commencing both at the back and belly; the section becomes first an ellipse, and then a rhombus, at the junction of the tail. At the distance of twelve or fourteen inches from the tail the perpendicular diameter is about twelve inches, the transverse diameter about seven. The head is about one-seventh of the whole length of the animal; it is small, blunt, round, and of a paraboloidal form. The mouth is small and not capable of much extension. The under-lip is wedge-shaped. The eyes are small, the largest diameter being only an inch, and are placed in a line with the opening of the mouth about thirteen inches from the snout. The blow-hole, which is directly over the eyes, is a single opening, of a semicircular form, about three and a half inches in diameter, or breadth, and one and a half radius, or length. The fins are twelve or fourteen inches long, and six or eight broad; the tail, from fifteen to twenty inches long, and three to four feet broad. It has no dorsal fin, but in place of it an irregular, sharpish, fatty ridge. The colour of the narwal is in the young animal blackish grey, on the back variegated with numerous darker spots, running into one another; in the older animals the ground is wholly white, or yellowish white. The integuments are similar to those of the mysticetus, only thinner.

A long prominent tusk, with which some narwals are furnished, is considered as a horn by the whale-fishers, and as such has given occasion for the name of *unicorn* being applied to this animal. This tusk occurs on the left side of the head, and is sometimes found of the length of nine or ten feet; according to Egède, fourteen or fifteen. It springs from the lower part of the upper-jaw, points forward and a little downward, being parallel in its direction to the roof of the mouth. It is spirally situated from right to left, is nearly straight, and tapers to a round, blunt point, is of a yellowish white colour, and consists of a compact kind of ivory. It is usually hollow from the base to within a few inches of the point. In a five feet tusk the diameter at the base is two and a quarter inches, and about three-eighths within an inch of the end. This external tusk is peculiar to the male, and there is another imbedded in the skull, on the right side of the head, about nine inches long. Two or three instances have occurred of male narwals having been taken, which had two large external tusks. The use of the tusk is ambiguous. It cannot be essential for procuring their food, nor for defence. Dr. Barclay is of opinion that it is principally a sexual distinction; and it appears not improbable that it is used in piercing the ice for convenience of breathing, without the animal being obliged to retreat to open water. If this latter supposition be correct, it affords another illustration of the wisdom of the great Creator, who has adapted in so many instances the organization of every animal to the locality which it inhabits.

A quantity of blubber, from two to three and a half inches in thickness, and amounting sometimes to above half a ton, encompasses the whole body of the narwal, and affords a large proportion of very fine oil. In a fine fatty substance about the internal ears of the narwal are found multitudes of worms. They are about an inch in length, some shorter, very slender, and taper both ways, but are sharper at one end than at the other. They are transparent. The vertebral column of the narwal is about twelve feet in length. The cervical vertebræ are seven in number, the dorsal twelve, the lumbar and caudal thirty-five. The spinal marrow appears to run through the processes of all the vertebræ from the head to the fortieth, but does not penetrate the forty-first. The ribs are twelve on each side, six true and six false, and are small for the size of the animal. The principal food of the narwal are molluscous animals. I have found remains of sepiæ in several stomachs which I have examined. Narwals are quick, active, inoffensive animals, and swim with considerable velocity. They appear in numerous little herds of half a dozen or more together, each herd being most frequently composed of animals of the same sex. When harpooned, the narwal dives with almost the velocity of the mysticetus, but not to the same extent; on returning to the surface it is dispatched with a lance in a few minutes.

Passing now from these tribes, a short space must be allotted to the description of the dolphins. The first is *Delphinus deductor*, defined by Dr. Traill, the ca'ing or leading whale. The following are its specific characters. Body thick, black; one short dorsal fin; pectoral fins long, narrow; head obtuse; upper jaw bent forward; teeth subconoid, sharp, and a little bent.

This animal grows to the length of about twenty-four feet, and is about ten feet in circumference. The skin is smooth, resembling oiled-silk; the colour a white blueish black on the back, and generally whitish on the belly; the blubber is three or four inches thick. The head is short and round; the upper jaw projects a little over the lower. Externally it has a single spiracle. The full grown have generally twenty-two to twenty-four teeth in each jaw, and when the mouth is shut, the teeth lock between one another like the teeth of a trap. The tail is about five feet broad, the dorsal fin about fifteen inches high, cartilaginous, and immovable.

This kind of dolphin sometimes appears in large herds off the Orkney, Shetland, and Feroe islands. The main body of the herd follows the leading whales, and from this property the animal is called in Shetland the ca'ing whale, and by Dr. Traill the deductor. Many herds of this animal have been driven on shore at different periods, and it is recorded that there were taken in two places in the year 1664 about a thousand; and in modern times extensive slaughters have taken place on the shores of the British and other northern islands.

The *Delphinapterus beluga* of La Cepède, *Delphinus Leucas* of Linnæus, *Beluga* of Pennant, or white whale of the fishers, is the last of the cetacea to which we shall refer. It is not unlike the narwal in its general form, but is thicker about the middle of its body in proportion to its length. Both jaws are furnished with teeth. It has no dorsal fin. The skin is smooth, the colour white. A male animal of this kind was taken in the Frith of Forth in June, 1815. The length was thirteen feet four inches, and the greatest circumference nine feet. The beluga is generally met with in families or herds of five or ten together. They are plentiful in Hudson's Bay, Davis's Strait, and on some parts of the northern coasts of Europe and Asia, where they frequent some of the larger rivers. They are taken for the sake of the oil they produce by harpoons or strong nets ; in the latter case, the nets are extended across the stream, so as to prevent their escape out of the river, and when thus interrupted in their course to seaward, they are attacked with lances, and great numbers are sometimes killed.

It is now our purpose to give an account of the *quadrupeds* which inhabit Spitzbergen and the icy seas adjacent.

The connecting link between the mammalia of the land and the water is *Trichecus rosmarus*, walrus, morse, or sea-horse of the whale-fishers.

It corresponds in several of its characters both with the bullock and the whale. It grows to the bulk of an ox. Its canine teeth, two in number, are of the length externally of ten to twenty inches, (some naturalists say three feet,) and extend downward from the upper jaw, and include the point of the lower jaw between them. They are incurvated inward. Their full length when cut out of the skull is commonly fifteen to twenty inches, sometimes almost thirty, and their weight five to ten pounds each or upward. The walrus being a slow clumsy animal on land, its tusk seems necessary for its defence against the bear, and also for enabling it to raise its unwieldy body upon the ice when its access to the shore is prevented.

The walrus is found on the shores of Spitzbergen twelve to fifteen feet in length, and eight to ten feet in circumference. The head is short, small, and flattened in front. The flattened part of the face is set with strong bristles. The nostrils are on the upper part of the snout, through which it blows like a whale. The fore paws, which are a kind of webbed hand, are two-sevenths of the full length of the animal from the snout. They are from two to two and a half feet in length, and being expansive may be stretched to the breadth of fifteen to eighteen inches. The hind feet, which form a sort of tail fin, extend straight backward. They are not united, but detached from each other. The length of each is about two to two and a half feet; the breadth, when fully extended, two and a half or three feet; the termination of each toe is marked by a small tail.

The skin of the walrus is about an inch thick, and it is covered with a short, yellowish brown coloured hair. The inside of the paws in old animals is defended by a rough, horny kind of casing, a quarter of an inch thick, probably produced by the hardening of the skin in consequence of coarse usage in climbing over ice and rocks.

Beneath the skin is a thin layer of fat. At some seasons the produce is said to be considerable, but I have never met with any that afforded above twenty or thirty gallons of oil. In the stomachs of walruses I have met with shrimps, a kind of craw-fish, and the remains of young seals.

It is not at all improbable that the walrus has afforded foundation for some of the stories of mermaids. I have myself seen a sea-horse in such a position, that it requires little stretch of imagination to mistake it for a human being; so like, indeed, was it, that the surgeon of the ship actually reported to me that he had seen a man with his head just appearing above the surface of the water.

The walrus is a fearless animal. It pays no regard to a boat, excepting as an object of curiosity. It is sometimes taken by a harpoon when in the water. If one attack fails, it often affords an opportunity for repeating it. The capture cannot be always accomplished without danger, for, as they go in herds, an attack made upon one individual draws all its companions to its defence. In such cases they frequently rally round the boat from which the blow was struck, pierce its planks with their tusks, and, though resisted in the most determined manner, sometimes raise themselves upon the gunwale, and threaten to overset it. The best defence against these enraged animals is, in such a crisis, sea-sand, which, being thrown into their eyes, occasions a partial blindness, and obliges them to disperse. When on shore they are best killed with long sharp-pointed knives.

The tusks of the walrus, which are hard, white, and compact ivory, are employed by dentists in the fabrication of false teeth. The skin is used in place of mats for defending the yards and rigging of ships from being chafed by friction against each other. When cut into shreds and plaited into cordage, it answers admirably for wheel-ropes, being stronger and wearing much longer than hemp. In ancient times, most of the ropes of ships, in northern countries at least, would appear to have been made of this substance. When tanned, it is converted into a soft porous leather, above an inch in thickness, but it is by no means so useful or so durable as in its green or raw state.

As early as the ninth century, we have accounts of the walrus being extensively fished for on the western coast of Norway. Prior to the institution of the Spitzbergen whale-fishery, the capture of this animal was an object of some commercial importance. It was at first attacked by the English, on Cherie Island, but being driven from thence, if not extirpated in that quarter, by the great slaughter that was carried on, it was then pursued to Spitzbergen. The earliest attacks made on it were very unsuccessful, but experience rendered the assailants more skilful, and, in one voyage, nine hundred or one thousand sea-horses were killed in less than seven hours. The Russians now, rather than the British, are their enemies.

With the exception of the head, the general form of the walrus is similar to the next animal which we describe, the phoca, or seal.

Several species of seals occur in the Greenland Sea, and resort to the ice in the neighbourhood of Spitzbergen and Jan Mayen, in immense herds; but, as the seal frequents the British coast, and is a well-described and well-known animal, I shall not particularize the well-known species that are met with in the Arctic Seas. Some few general observations only will be necessary.

Seals are generally fat in the spring of the year, and afford several gallons of blubber; even small seals will then yield about four or five gallons of oil. The voice of the young seal when in pain or distress is a whining cry, resembling that of a child. They appear to hear well under water; music, or particularly a person whistling, draws them to the surface, and induces them to stretch their necks to the utmost extent, so as to prove a snare by bringing them within reach of the shooter. The most effectual way of shooting them is by the use of small shot, fired into their eyes; when killed with a bullet they generally sink, and are lost. Seals are often seen on their passage from one situation to another in very large shoals. Their general conduct in such cases is such as to amuse spectators, and the sailors call such a shoal a "seal's wedding." The feet of seals are better adapted for motion in the water than on land. They feed on birds, crabs, and small fishes, and are very tenacious of life.

The uses of the seal are various, and to some nations highly important. It yields train-oil, and its skin is extensively employed in making shoes, and, when dressed with the hair, in covering trunks. To the Esquimaux the seal is everything. Its flesh is food, its fat gives light, and its skin, dressed so as to be waterproof, is used for covering for boats and tents, and for garments.

The *Phoca vitulina* is the common species in the Greenland Sea, especially near Jan Mayen. The hooded seal is common near Spitzbergen. The latter is longer than the former, and is said to grow to the length of ten or twelve feet. It is also much more formidable. Seals are not fond of the water, but, when on the ice, are extremely watchful, and secure their retreat either by reclining at the edge or by keeping a hole in the ice open for them. The young ones, however, are not so wary as the old folks. The best situation for the seal-fishery in the Arctic Sea is in the vicinity of Jan Mayen, and the best season March and April. The capture of the seal is the work of a moment. A blow with a seal-club on the nose immediately stuns it, and affords opportunity of making a prize of many at a time. Ships fitted out for the whale-fishery have accidentally obtained in April from two thousand to three thousand seals, and sometimes more; and vessels sent out for seal-fishery only, four thousand or five thousand, yielding nearly one hundred tons of oil. From the ports of the Elbe and Weser a number of sealers are annually dispatched, but few comparatively on this pursuit alone sail from Britain.

Of the dangers of the seal-fishery, arising from the liability to heavy storms at the season and in the place where seals are taken, the following narrative will furnish full illustration.

Fifty-four ships, chiefly Hamburghers, were, in the year 1774, fitted out for seal-fishery alone from foreign ports. In the spring of the year they met with several English ships on the borders of the ice, about sixty miles to the eastward of the island of Jan Mayen. While the boats of the fleet were in search for seals, a dreadful storm suddenly arose. Almost all the people who were at a distance from the ships perished. The Duke of York, captain Peters, had two boats at that time down. The crews of these by great exertion rowed up to the ship, got hold of the rudder rings, but were unable to make their way alongside; they held fast for some time, but the sea was too strong for them, and they lost their hold and fell astern. The chief-mate of the ship, seeing that they were too exhausted to recover their position, determined to attempt their rescue at the peril of his own life. He manned a boat with six stout seamen beside himself, and went to their assistance. On reaching them he exchanged four of his vigorous crew for two of the fainting men in each boat. Thus reinforced, the three boats, by the exertions of their crews, were brought to the stern of the ship; but while in this critical situation, a sea struck the boats, filled and overwhelmed them, on which the whole of their crews, nineteen men, perished. This was only a portion of the disasters of the storm. One ship foundered in a heavy surge, and all hands were lost. Another was wrecked on the ice, and all hands perished. Many boats and men were washed from several others, and the results were that about four hundred foreign seamen, and two hundred British, were drowned, four or five ships lost, and scarcely any escaped without damage.

To all those who navigate the treacherous ocean, especially to such as do business in such dangerous waters, it ought to be of more than ordinary importance to live in a continued preparation for death and judgment, and to be the servants of that God who

> "—— rides upon the stormy sky
> And manages the seas."

Beneath his care the mariner is safe, and whether from the abysses of its ancient caves, or the foundations of its lofty icebergs, the sea must surrender unto eternal life the bodies of the disciples of Jesus.

The Arctic fox, *Canis lagopus*, is an animal known to those who winter in Spitzbergen, though seldom seen by the whale-fishers. They are rarely found on the ice, though I have often found their impressions on the snow. They are of a white colour, and not easily distinguished.

A more remarkable animal is the Polar or Greenland bear, *Ursus maritimus*. He is the sovereign of the quadrupeds of the Arctic countries. He is powerful and courageous; savage and sagacious; apparently clumsy, yet not inactive. His senses are extremely acute, especially his sight and smell. As he traverses extensive fields of ice, he mounts the hummocks and looks for prey, and on rearing his head and snuffing the breeze, he can perceive the scent of the carrion of the whale at an immense distance. Seals are his usual food, but from their watchfulness he is often obliged to fast. He is as much at home on the ice as on the land, and is found on field-ice above two hundred miles from shore. He can swim with the velocity of three miles an hour, and can dive to a considerable distance.

Bears occur in Spitzbergen, Nova Zembla, Greenland, and other Arctic countries, throughout the year. In some places, they are met with in great numbers. By means of the ice, they often effect a landing on Iceland, but as soon as they appear, they are generally attacked by the inhabitants and destroyed. On the east coast of Greenland, they have appeared like flocks of sheep on a common.

The size of the bear is generally four or five feet in height, seven or eight in length, and nearly as much in circumference. Sometimes, however, the size is much larger. His paws are seven inches in breadth, and his claws two inches in length. His canine teeth, exclusive of the part in the jaw, are about an inch and a half in length. He has been known by the strength of his jaw to bite a lance in two, though made of iron half an inch in diameter. In the water he can be captured without much danger, but on land the experiment is hazardous. When pursued and attacked, he turns upon his enemies. He always, however, unless urged by hunger, retreats before men. His general walk is slow, but upon the ice he can easily outrun any man. If struck with a lance, he is apt to seize it in his mouth, and either bite it in two, or wrest it out of the hand. If shot with a ball, unless he is struck in the head, in the heart, or in the shoulder, he is enraged rather than depressed, and falls with increased power upon his pursuers. When shot at a distance, and able to escape, he has been observed to retire to the shelter of a hummock, and, as if conscious of the styptical effect of cold, apply snow with his paws to the wound.

The bear feeds on the kreng, or carcases of the whales, as they are left by the fishers; on seals, birds, foxes, and deer, when it can surprise them; on eggs, and indeed on any animal substance that comes within its power. The skin of the bear, when dressed with the hair on, forms beautiful mats for a hall or for the bottom of a carriage. Prepared without being ripped up, and the hairy side turned inward, it forms a very warm sack bed, and is used as such in some parts of Greenland. The flesh, when cleared of the fat, is well flavoured and savoury, especially the muscular part of the ham. I once treated my surgeon with a dinner of bear's ham, and he did not know for above a month afterwards, but that it was beefsteak. The liver is very unwholesome.

Bears are remarkably affectionate towards their young, and peculiarly sagacious. The female has generally two at a birth. On one occasion, a mother bear with two cubs was pursued across a field of ice by a party of armed sailors. At first, she urged her young ones to increase their speed, but finding the pursuers gaining on them, she carried or pushed or pitched them alternately forward, until she effected their escape. The little creatures are said to have placed themselves across her path to receive her impulse, and when thrown forward they ran on till she overtook them, when they adjusted themselves for a second throw.

Many instances have been observed of the peculiar sagacity of these animals. A seal, lying on the middle of a large piece of ice, with a hole just before it, was marked out by a bear for its prey, and secured by the artifice of diving under the ice, and making its way to the hole by which the seal was prepared to retreat. The seal, however, observed its approach, and plunged into the water, but the bear instantly sprang upon it, and appeared in about a minute afterwards with the seal in its mouth.

The captain of one of the whalers being anxious to procure a bear without wounding the skin, made trial of the stratagem of laying the noose of a rope in the snow, and placing a piece of kreng within it. A bear, ranging the neighbouring ice, was soon enticed to the spot by the smell of burning meat. He perceived the bait, approached, and seized it in his mouth, but his foot, at the same moment, by a jerk of the rope being entangled in the noose, he pushed it off with the adjoining paw, and deliberately retired. After having eaten the piece he carried away with him he returned. The noose, with another piece of kreng, being then replaced, he pushed the rope aside, and again walked triumphantly off with the kreng. A third time the noose was laid, and this time the rope was buried in the snow and the bait laid in a deep hole dug in the centre. But Bruin, after snuffing about the place for a few minutes, scraped the snow away with his paw, threw the rope aside, and escaped unhurt with his prize.

In the month of June, 1812, a female bear, with two cubs, approached the ship I commanded, and was shot. The cubs, not attempting to escape, were taken alive. These animals, though at first evidently very unhappy, became at length, in some measure, reconciled to their situation, and being tolerably tame, were allowed occasionally to go at large about the deck. While the ship was moored to a floe, a few days after they were taken, one of them, having a rope fastened round its neck, was thrown overboard. It immediately swam to the ice, got upon it, and attempted to escape. Finding itself, however, detained by the rope, it endeavoured to disengage itself in the following ingenious way:—Near the edge of the floe was a crack in the ice, of considerable length, but only eighteen inches or two feet wide, and three or four feet deep. To this spot the bear returned; and when, on crossing the chasm, the bight of the rope fell into it, he placed himself across the opening; then, suspending himself by his hind feet, with a leg on each side, he dropped his head and most of his body into the chasm, and, with a foot applied to each side of the neck, attempted for some minutes to push the rope over his head. Finding this scheme ineffectual, he removed to the main ice, and running with great impetuosity from the ship, gave a remarkable pull on the rope; then, going backward a few steps, he repeated the jerk. At length, after repeated attempts to escape this way, every failure of which he announced by a significant growl, he yielded himself to his hard necessity, and lay down on the ice in angry and sullen silence.

Accidents with bears occasionally occur; not so many, however, as the ferocity of these animals, and the temerity of the sailors, might lead one to expect. Some of the early voyagers to the Polar Seas had hard conflicts with them. Barentz's crew especially were often in danger from them, but always succeeded either in conquering or repelling them. Two, however, of the crew of a vessel which had anchored near Nova Zembla, landed on an island at the mouth of the Weigats, and, impelled by curiosity, wandered some distance from the beach; but, whilst unconscious of danger, one of them was suddenly seized on the back by a bear, and brought to the earth. His companion ran off, and gave the alarm, and a party of his shipmates came to their assistance. The bear stood over its prey during their approach without the least appearance of fear and, on their attack, sprang upon one of their number, and made him also a victim to its ferocity and power. The rest now fled in confusion, and could not be induced to renew the conflict. Three sailors only among the crew had sufficient courage to combat with this formidable animal; they attacked it, and, after a dangerous struggle, killed it, and rescued the mangled bodies of their two unfortunate shipmates.

Captain Cook, of the Archangel, of Lynn, being near the coast of Spitzbergen, in the year 1788, landed, accompanied by his surgeon and mate. While traversing the shore, the captain was unexpectedly attacked by a bear, which seized him in an instant between its paws. At this awful juncture, when a moment's pause must have been fatal to him, he called to his surgeon to fire; who, with admirable resolution and steadiness, discharged his piece as directed, and providentially shot the bear through the head. The captain, by this prompt assistance, was preserved from being torn to pieces.

On a more recent occasion, a commander of a whale ship was in a similar danger. Captain Hawkins, of the Everthorpe, of Hull, when in Davis's Strait, in July, 1818, seeing a very large bear, took a boat, and pushed off in pursuit of it. On reaching it, the captain struck it twice with a lance in the breast; and, while in the act of recovering his weapon for another blow, the enraged animal sprang up, and seized him by the thigh, and threw him over its head into the water. Fortunately it did not repeat its attack, but exerted itself to escape. This exertion, when the attention of every one was directed towards their captain, was not made in vain, for it was allowed to swim away without further molestation.

With regard to curious adventures, on one occasion a bear, which was attacked by a boat's crew, made such formidable resistance, that it was enabled to climb the side of the boat and take possession of it, while the intimidated crew fled for safety to the water, supporting themselves by the gunwale and rings of the boat, until, by the assistance of another party from the ship it was shot, as it sat inoffensively in the stern. With regard to narrow escapes, a sailor, who was pursued on a field of ice by a bear, when at a considerable distance from assistance, preserved his life by throwing down an article of clothing whenever the bear gained upon him, on which it always suspended the pursuit until it had examined it, and thus gave him time to obtain some advance. In this way, by means of a hat, a jacket, and a neckerchief, successively cast down, the progress of the bear was retarded, and the sailor escaped from the danger that threatened him, in the refuge afforded him by his vessel.

The rein-deer, *Cervus tarandus*, deserves to be mentioned amongst the quadrupeds of the Arctic regions. I have never seen one myself, though it is known to inhabit almost every part of Spitzbergen.

Our remarks must now be directed to the *Birds* which frequent the sea and coast of Spitzbergen.

The brent goose and eider duck, *Anas bernicla* and *Anas mollissima*, are found in these regions; the former occurring in considerable numbers near the coast of Greenland, but not in Spitzbergen, and the latter frequenting all the islands in the Greenland Sea. The puffin, or Greenland parrot, *Alca arctica*, feeding on shrimps, is rarely seen out of sight of land, but is very common near the coast of Spitzbergen. *Alca alle*, also, the little auk or roach, is an extremely numerous species in some situations in the Polar Seas. They occur in the water in thousands together, and sometimes in like abundance on the pieces of ice. They dive quickly on being alarmed, and on the approach of thick weather they are particularly noisy.

The fulmar, *Procellaria glacialis*, is the constant companion of the whale-fisher. It joins his ship immediately on passing the Shetland Islands, and accompanies it through the trackless ocean to the highest accessible latitudes. It keeps an eager watch for anything thrown overboard; the smallest particle of fatty substance can scarcely escape it. As such, a hook baited with a piece of fat meat or blubber, and towed by a long twine over the ship's stern, is a means employed by the sailor-boys for taking them. In the spring of the year, before they have glutted themselves with the fat of the whale, they are pretty good eating. They are remarkably easy and swift on the wing, and can fly to windward in the highest storms. Though very few fulmars should be seen when a whale is about being captured, yet, as soon as the flensing commences, they rush in from all quarters, and seize, with great audacity, all the pieces of fat that come in their way. They frequently glut themselves so completely as to be unable to fly, in which case, when not relieved by a quantity being disgorged, they rest on the ice until restored by digestion. The fulmar is a bold and very hardy bird. Its feathers being thick, it is not easily killed with a blow. Its bite, from the crookedness, strength, and sharpness of its bill, is very severe. Fulmars differ in colour; some are a dirty grey, others much paler, and totally white on the breast and belly. In size this bird is a little smaller than a duck. Beneath its feathers is a thick bed of fine grey down. When carrion is scarce, the fulmar sometimes points out the whale to the fisher by following in its track. They cannot make much impression on the dead whale until some more powerful animal tears away the skin.

The tysté, or doveca, *Colymbus grylle*, is a beautifully formed bird, occurring in considerable numbers in icy situations, at various distances from land. It is so watchful, and so quick at diving, that, if fired at without precaution to conceal the flash of the powder, it generally escapes the shot. It feeds on shrimps and small fishes. The common colour is black, but the feet are all red.

Almost equally common with the preceding is the *Colymbus troile*, a clumsy bird, weighing two pounds or upwards, and measuring only sixteen or seventeen inches in length, and twenty-eight inches across the wings, when full spread, in breadth. It cannot rise on the wing in any direction except to windward. If it attempts to fly to leeward, it runs for a considerable distance along the surface of the water, and at length falls into it. Both in this instance and that of the doveca, shortness of tail is compensated for by the feet, which are used as a rudder in flying. The *Colymbus glacialis* was seen by captain Phipps on the coast of Spitzbergen.

The sea-swallow, or great tern, *Sterna hirundo*, is an elegant bird, common on the shore of Spitzbergen, but is not met with at a distance from land. Its length is seven or eight inches, and including the tail fourteen, and the spread of its wings twenty-nine or thirty inches. It flies with great ease and swiftness, and to a considerable height. It defends its eggs and young with great boldness from the Arctic gull, and even descends within a yard of the head of any person who ventures to molest them, startling him with its loud screams. It lays its eggs among the shingle of the beach above high-water mark, where the full power of the sun falls.

There are several varieties of the gull tribe. The kittywake, *Larus rissa*, is seen in every part of the northern Atlantic from Britain to the highest latitudes. It is a better fisher than its enemy, the Arctic gull, *Larus parasiticus*, by whom it is pursued until it gives up the food it has procured. The latter kind of gull lives at the expense of its neighbours, preying upon their eggs and their young. *Larus crepidatus* and *Larus eburneus* are other varieties. The latter, remarkable for its immaculate whiteness, is as ravenous as the fulmar. *Larus glaucus*, burgomaster, is the chief magistrate of the feathered tribe in the Spitzbergen regions, as none of its class dare dispute its authority, or refuse at its bidding to surrender their prey It is a large and powerful bird, twenty-eight inches in length, and five inches in breadth across the wings. The kittywake, snow-bird, and burgomaster, are sometimes shot for the sake of their feathers. The two latter species are very shy. They are shot with the greatest ease, however, from a house built of snow on the ice. The *Tringa hypoleucos*, sandpiper, and the *Emberiza nivalis*, snow-bunting, are inhabitants also of these regions. A bird of great delicacy and smallness is *Fringilla linaria*, the lesser redpole. On our approach to Spitzbergen, several of this species alighted on the ship, and were, apparently, so wearied by flight that they allowed themselves to be taken alive. It is difficult to understand how this small bird manages to perform the journey from Spitzbergen to a milder climate, without becoming exhausted and perishing by the way.

The *Amphibia*, *Fishes*, *Animalcules*, etc., must conclude our sketch of the zoology of the Arctic regions.

In the class *Amphibia*, the most notable personage is the Greenland shark, *Squalus borealis*. It has not, I believe, been described. The ventral fins are separate. It is without anal fin, but has the temporal opening, and it belongs, therefore, to the third division of the genus. The spiracles on the neck are five in number on each side. The colour is cinereous grey. The eyes are the most extraordinary part of the animal. The pupil is emerald green, the rest of the eye blue. To the posterior edge of the pupil is attached a white vermiform substance, one or two inches in length. Each extremity of it consists of two filaments, but the central part is single. The sailors imagine this shark is blind, because it pays not the least attention to the presence of a man, and is, indeed, so apparently stupid, that it never draws back when a blow is aimed at it with a knife or a lance. It is twelve or fourteen feet in length, and six or eight feet in circumference, and in general form very much resembles the dog-fish. It is one of the foes of the whale. It bites and annoys it when living, and feeds on it when dead. With its teeth, which are serrated in one jaw, and lancet-shaped and denticulated in the other, it scoops out of the body of the whale pieces as large as a person's head, and continues scooping and gorging till its belly is filled. It is so insensible to pain that, though run through the body with a knife, it will return to its food, and for some hours after its heart is taken out, or its body cut in pieces, they will continue to show signs of life. It does not, so far as I am aware, attack the fishers.

In the class *Pisces*, *Gadus carbonarius*, the coal-fish, was procured by captain Phipps, as also of the former class, *Cyclopterus liparis*, during his stay in the vicinity of Spitzbergen. *Mullus barbatus* was taken out of the mouth of a seal by a seaman, near Spitzbergen. It was boiled by our officers, and proved an excellent dish.

In the class *Articulata* are one or two species of *gammarus*. The *G. arcticus* of Leach, the actions of which suggest as a familiar name, the mountebank shrimp. There are also various crabs, and the *Oniscus ceti* of Linnæus, or whale's louse. This little animal is about half an inch in diameter, and firmly fixes itself by hooked claws on the skin of the mysticetus. It is found under the fin, and wherever the skin is tender, and it is not likely to be dislodged. A similar animal, though smaller, is found on the body of the narwal.

In the class *Vermes* are several species found in various animals inhabiting the northern seas. The sea-snail, *Clio helicina*, is an animal covered with a delicately beautiful sheet, similar to that of the nautilus. The diameter is from two-eighths to three-eighths of an inch. It is found in great quantities near the coast of Spitzbergen. The *Clio borealis* occurs in vast numbers in some situations near Spitzbergen, but is not found generally in the Arctic Seas. In swimming, it brings the tips of its fins almost into contact, first on one side and then on another. I kept several of them alive in a glass of sea-water for about a month, when they gradually wasted away and died.

The cuttle-fish, *Sepia*, were found by me in large numbers in the stomachs of the narwals.

More than six or seven kinds of *Medusæ* may be distinguished, among which may be named, *Medusa pileus*, and the purse-shaped, bottle-shaped, and orange-coloured *medusæ*. *Medusa pileus* is one of the most curious of the tribe. It consists of eight lobes, with a beautiful, irridescent, finny fringe on the external edge of each. A canal, four-fifths the length of the animal, penetrates the centre of it, and two red cirrhi, which may be extended to the length of nearly a foot, proceed from a crooked cavity in opposite sides. The animal is semi-transparent, the colour white, and the finny fringes of deeper red. It is found of various sizes.

The substance of the purse-shaped medusa is tougher than that of any other species which I have examined. It has one large open cavity, and is divided by the finny fringes into eight segments, each alternate pair of which are similar. The colour is a pale crimson, with waved purple lines, and the finny fringes deeper crimson. The animal appeared to be almost without sensation. The only evidence it gave of feeling was in an increased vibration of the finny fringes. Though it was cut into pieces, each portion on which there was any of the fringe continued, by its incessant play, to give evidence of life during two or three days, after which it became putrescent, and began to waste away. I have only seen one specimen of this and of the orange-coloured medusa. The colour of the latter was a brilliant orange, and it was not transparent. It was not tenacious of life, having died, to appearance, soon after it was taken.

The Greenland Sea, frozen and extensive as it is, teems with life. The variety of the animal creation is not, indeed, very great, but the quantity of some of the species that occur is truly immense. The minute medusæ and animalcules, throughout the Spitzbergen Sea, would exceed all the powers of the mind to conceive. These little creatures constitute the food of the largest animals in the creation. The common whale feeds on medusæ, sepiæ, cancri, actiniæ, etc., and these feed, probably, on the minor medusæ animalcules. The fin-whales and dolphins feed principally on herrings and other small fishes. These subsist on the smaller cancri, medusæ, and animalcules. The bear's most general food is the seal; the seal subsists on the cancri and small fishes, and these on lesser animals of the tribe, or on the minor medusæ and animalcules. Thus the whole of the larger animals depend on these minute beings, which, until the year 1816, when I first entered on the examination of the sea-water, were not, I believe, known to exist in the Polar Seas.

The manner in which these minute animals are preserved, in a sea which is surrounded by an atmosphere ten or twelve degrees in mean temperature below the freezing point of salt water, is curious and interesting, and illustrates the combined wisdom and goodness of the Lawgiver of these icy regions, as well as of the entire globe. If the water of the sea were stationary, the temperature of the atmosphere would soon freeze it to the very bottom, and destroy all these minute animals, who have not either instinct or power of motion to retire into a more southern region. A current, however, is provided, setting towards the south-west, which carries away the ice into a parallel where it can be dissolved, and creates a circulation of water into the frozen regions from a warmer climate; while therefore the superficial current is carrying away the ice, an under-current, in a contrary direction, is bringing in warmth beneath. But how, it may be asked, does it happen that the minor medusæ are not carried away into the southern region? It is no violation of commonly received principles to suppose, that whenever the medusæ are carried to some extent southward, they sink in the water until they reach the stream of the under-current, and are by it conveyed to their proper element. The fact that the olive-green water of the sea maintains a similar position for years together, while surface after surface of ice is carried away and dissipated, is in support of this conjecture. Thus, by a most beautiful contrivance, a large portion of the surface of the globe is rendered habitable, which would otherwise be a solid mass of ice, and the Polar Sea affords a dwelling-place for many tribes of animals most useful in supplying the wants, and contributing to the comfort, of man.

It is not only, therefore, in those regions where

"Spices breathe and milder seasons smile,"

but even in the laws of a less genial climate, that we are called upon to observe His eternal power and godhead, who gives the bounties of his providence to the just and the unjust, and pleads with us, in the gospel of his Son, that we should be reconciled to him. The mighty whale, the ephemeral insect, and the minute animalcule, all the productions of his power and skill, have their wants supplied by his laws, and are subject to his control. In these he displays the strength of his arm, and the adaptations of his wisdom, but in man, redeemed and sanctified, "the exceeding riches of his grace." Happy, indeed, are we, if whilst, with the ancient psalmist, we can proclaim that the earth is full of the goodness of the Lord, "who gathereth the waters of the sea together as an heap," and "layeth up the depth in storehouses," we can also, without presumption, through our union with the great heir of all things, the Lord Jesus, and by the merit of his life and death, honestly declare all things are ours, whether . . . the world, or life, or death, or things present, or things to come, all are ours, and we are Christ's, and Christ is God's.

CHAPTER VI.

EXPEDITIONS FOR FURTHER DISCOVERY.

HAVING now completed the account of the Arctic Regions, as given by captain Scoresby, it may be interesting to the reader to have a brief statement of some of the principal expeditions for further discovery down to the present time.

In 1819, lieutenant Parry sailed with the Hecla and Griper. The object of his expedition was to examine the great and open bay, known as sir J. Lancaster's Sound; and, in case of failure, the Sound of alderman Jones, and that of sir T. Smith. On the 1st of August, the ships entered the Sound of sir J. Lancaster, and ran quickly up it, finding no land across the bottom of the inlet, but arriving at a strait, which they named Barrow's Strait, and a magnificent opening into which it led, Wellington Channel. On the 4th of September, the expedition crossed the meridian of 110° west longitude, in latitude 74° 44′, becoming entitled to a reward of £5,000. They anchored, and put into winter-quarters at Melville Island, losing sight of the sun from 11th November till the 3rd of February, when it became once more visible from the Hecla's main-top. With the greatest difficulty, they managed to escape from the ice during the months of August and September, arriving at the Orkneys 28th October, 1820.

The second voyage of Parry was with the Fury and Hecla. His instructions were to proceed towards, or into, Hudson's Strait, to penetrate to the westward through that strait, until he should reach some portion of the coast of the continent of America. The object was to discover a way westward from the Atlantic into the Pacific Ocean. The vessels left the Nore 8th May, 1821, and arrived at Resolution Island, at the entrance of Hudson's Strait, on 2nd July, attempted the direct passage through the Frozen Strait, and passed through it into Repulse Bay. From it no passage was found to the west, and the ships, after beating about to no profit, were compelled to winter near Lyon's Inlet. Here the dreariness of the winter was relieved by interviews with the inhabitants, who were found to be intelligent and honest. On 2nd July, the ships left their winter-quarters, and, after being exposed to the most fearful dangers, arrived at a strait, called by Parry, the Strait of the Fury and Hecla, and believed by him to be an opening into the Polar Sea. The ships again went into winter-quarters, and were frozen in until late in the following year, but arrived at Lerwick on October 10th, 1823.

The same ships, under the same commander, sailed on a third expedition in May, 1824, having for its object to penetrate through Lancaster Sound, Barrow's Strait, and Prince Regent's Inlet, to the westward. Through detention by the ice, they did not arrive at Lancaster Sound till 10th September, and went into winter-quarters on the 27th, in Prince Regent's Inlet, at Port Bowen. On the breaking up of the ice, they explored, southerly, close to the westward shore; but by the accidents to which they were exposed, they were compelled to abandon the Fury, with her stores, and the Hecla only returned to England.

In 1827, captain Parry proposed to reach the North Pole by means of travelling with sledge-boats over the ice. Two boats were constructed for the purpose, the one to be commanded by Parry, the other by lieutenant Ross. They proceeded in the Hecla to Spitzbergen, and there left the ship, starting in their sledge-boats with seventy-one days' provisions. They travelled by night rather than by day; found the ice very rough, and in some places tender; and after experiencing great difficulties, arrived only at latitude 82° 45′, and were compelled to abandon the undertaking as hopeless.

Captain John Franklin received instructions to explore the northern coast of America, from the mouth of Copper Mine River to the eastward. He sailed on 22nd May, 1819, in a ship of the Hudson's Bay Company. They arrived at York Factory, in Hudson's Bay, on 30th August. Their route was to be by Cumberland House, and through a chain of posts to the Great Slave Lake. At Cumberland House, it was arranged that Franklin and others should proceed at once on to the Athobasca department, to the northward of the Great Slave Lake, and that the rest of the party should follow in the spring. The place of meeting was Fort Chepewyan, eight hundred and fifty-seven miles from Cumberland House; and, by the 20th August, they had advanced to Fort Enterprise, five hundred and fifty miles from Chepewyan. Here they wintered, and were exposed to awful hardships; but, on the arrival of the spring, they prosecuted their journey down the Copper Mine River, reaching the Polar Sea on the 18th July. They then navigated the coast to the eastward, in their canoes, exploring Coronation Gulf. They attempted to return by Hood's River, and across the land to Point Lake. After being exposed to the most dreadful sufferings, they regained their winter-stations, at Fort Enterprise, and returned to England.

Notwithstanding the perils and hardships which had already befallen them, captain Franklin and his companions, Dr. Richardson and lieutenant Back, undertook a second expedition over the same country, and left Liverpool 16th February, 1825, arriving at Fort Chepewyan as early as 15th July. They then descended Mackenzie River to the sea. Dividing themselves into two parties, they explored the coast east and west, and the expedition returned home 24th September, 1827.

Other voyages are those of Ross, of Back, first and second, and of Dease and Simpson, two officers of the Hudson's Bay Company, who surveyed, in 1839, the remainder of the western coast which had been left by Franklin. Dr. John Rae was dispatched by the Hudson's Bay Company in July, 1846, to survey the unexplored portion of the Arctic coast at the north-eastern angle of the American continent, and returned successfully in October, 1847.

An important expedition for discovery in the North Polar regions, the termination of which is yet awaited with serious anxiety, left England under sir John Franklin in July, 1845. The ships were victualled for only three full years, which expired during the summer of this year. Three expeditions have been sent in search of the lost travellers. One departed early in February, 1848, for Behring's Strait; a second, which sailed in the spring, under sir J. Ross, has been heard of as having reached Disco Island on the 2nd July; and a third, under sir John Richardson, accompanied by Dr. Rae, left in March to proceed overland, and arrived at Lake Superior on 29th of April. A report has very recently come in from the Esquimaux of their having seen "two large boats, full of white men, to the east of the Mackenzie river;" and sir J. Ross has been spoken with by a whaler on the east side of Baffin's Bay, in latitude 74° 20′; but no tidings to relieve the public anxiety have been received to the close of 1848, concerning the fate of sir J. Franklin and his companions.

THE RELIGIOUS TRACT SOCIETY: INSTITUTED 1799.

THE

NORTHERN WHALE-FISHERY.

BY

CAPTAIN SCORESBY, F.R.S.E.

PREFACE.

The following pages are an abridgment, with some modifications and additions, of the second volume of captain (now the rev. Dr.) Scoresby's work on the Arctic Regions and Whale-fishery, Edinburgh, 1820; the substance of the former volume having already appeared in this Monthly Series. The second chapter of the work, on the comparative view of the whale-fisheries of different European nations, has been entirely omitted, as less interesting, it is supposed, to the general reader, than the other chapters.

The second part of "Scoresby on the Whale-fishery" it is intended shall form another volume, complete in itself, of this Monthly Series.

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THE

NORTHERN WHALE-FISHERY

CHAPTER I.

CHRONOLOGICAL HISTORY OF THE NORTHERN WHALE-FISHERIES.

In the early ages of the world, when beasts of prey began to multiply and annoy the vocations of man, the personal dangers to which he must have been occasionally exposed would oblige him to contrive some means of defence. For this end, he would naturally be induced both to prepare weapons, and also to preconceive plans for resisting the disturbers of his peace. His subsequent rencounters with beasts of prey would, therefore, be more frequently successful, not only in effectually repelling them when they should attack him, but also, in some instances, in accomplishing their destruction. Hence, we can readily and satisfactorily trace to the principles of necessity the adroitness and courage evidenced by the unenlightened nations of the world, in their successful attacks on the most formidable of the brute creation; and hence we can conceive that necessity may impel the indolent to activity, and the coward to actions which would not disgrace the brave. For man to attempt to subdue an animal whose powers and ferocity he regarded with superstitious dread, and the motion of which he conceived would produce a vortex sufficient to swallow up his boat, or any other vessel in which he might approach it—an animal of at least six hundred times his own bulk, a stroke of the tail of which might hurl his boat into the air, or dash it and himself to pieces—an animal inhabiting at the same time an element in which he himself could not subsist; for man to attempt to subdue such an animal, under such circumstances, seems one of the most hazardous enterprizes of which the intercourse with the irrational world could possibly admit. And yet this animal is successfully attacked, and seldom escapes when once he comes within reach of the darts of his assailer.

It seems to be the opinion of most writers on the subject of the whale-fishery, that the Biscayans were the first who succeeded in the capture of the whale. This opinion, though perhaps not correct, deserves to be mentioned in the outset of an investigation into the probable origin of this employment. A species of whale, probably the *Balæna rostrata*, was a frequent visitor to the shores of France and Spain. In pursuit of herrings and other small fishes, these whales would produce a serious destruction among the nets of the fishermen of Biscay and Gascony. Concern for the preservation of their nets, which probably constituted the whole of their property, would naturally suggest the necessity of driving these intruding monsters from their coasts. With this view, arrows and spears, and subsequently gunpowder, would be resorted to. Finding the whales timid and inoffensive, the fishers would be induced to approach some individual of the species, and even to dart their spears into its body. Afterwards they might conceive the possibility of entangling some of the species, by means of a cord attached to a barbed arrow or spear. One of these animals being captured, and its value ascertained, the prospect of emolument would be sufficient to establish a fishery of the cetaceous tribe, and lead to all the beneficial effects which have resulted in modern times.

Those authorities, indeed, may be considered as unquestionable, which inform us that the Basques and Biscayans, so early as the year 1575, exposed themselves to the perils of a distant navigation, with a view to measure their strength with the whales, in the midst of an element constituting the natural habitation of these enormous animals; that the English, in 1594, fitted an expedition for Cape Breton, intended for the fishery of the whale and the walrus, (sea-horse,) pursued the walrus-fishing in succeeding years in high northern latitudes, and, in 1611, first attacked the whale near the shores of Spitzbergen ; and that the Hollanders, and subsequently other nations of Europe, participated in the risk and advantages of these northern expeditions. Some researches, however, on the origin of this fishery, carried on in the northern seas, will be sufficient to rectify the error of these conclusions, by proving that the whale-fishery by Europeans may be traced as far back at least as the ninth century.

The earliest authenticated account of a fishery for whales is probably that contained in Ohthere's voyage, by Alfred the Great. This voyage was undertaken about 890, by Ohthere, a native of Halgoland, in the diocese of Dronthein, a person of considerable wealth in his own country, from motives of mere curiosity, at his own risk, and under his personal superintendence. On this occasion, Ohthere sailed to the northward, along the coast of Norway, round the North Cape, to the entrance of the White Sea. Three days after leaving Dronthein, or Halgoland, "he was come as far towards the north as commonly the whale-hunters used to travel." Here Ohthere evidently alludes to the hunters of the walrus, or sea-horse ; but subsequently, he speaks pointedly as to a fishery for some species of cetaceous animals having been at that period practised by the Norwegians. He told the king, that with regard to the common kind of whales, the place of most and best hunting for them was in his own country, "whereof some be forty-eight ells of length and some fifty," of which sort, he affirmed, that he himself was one of the six who, in the space of three (two) days, killed threescore.

From this it would appear, that the whale-fishery was not only prosecuted by the Norwegians so early as the ninth century, but that Ohthere himself had personal knowledge of it. The voyage of Ohthere is a document of much value in history, both in respect to the matter of it, and the high character of the author by whom it has been preserved. By a slight alteration in the reading of the Saxon manuscript, as suggested by Turner, in his History of the Anglo-Saxons, it is possible to suppose that the threescore animals slain by Ohthere in two days were not whales but dolphins. This supposition removes the improbability of the exploit recorded, and does not contradict or explain away the fact of larger whales having been likewise hunted and captured.

A Danish work, which there is reason to believe is of a date much earlier than that which we assign to the first fishery of the Basques, declares that the Icelanders were in the habit of pursuing the whales, which they killed on the shore, and that these islanders subsisted on the flesh of some one of the species. And Langebek does not hesitate to assert, that the fishery of the whale (*hovlfangst*, by which he probably means a species of *delphinus*,) was practised in the most northern countries of Europe in the ninth century.

Under the date of 875, in a book entitled the "Translation and Miracles of St. Vaast," mention is made of the whale-fishery on the French coast. In the "Life of St. Arnould, bishop of Soissons," a work of the eleventh century, particular mention is made of the fishery by the harpoon, on the occasion of a miracle said to have been performed by the saint. There are also different authorities for supposing that a whale-fishery was carried on near the coast of Normandy and Flanders, from the eleventh to the thirteenth century.

The English, it is to be expected, did not remain long behind their continental neighbours in this lucrative pursuit. It is difficult to determine whether the whales referred to in the few early documents which we possess, were such as were run on the English shore by accident, or subdued by the English on the high sea. By Acts of Parliament, A.D. 1315 and 1324, the wrecks of whales, cast by chance upon the shore, or whales or great sturgeons *taken* in the sea, were to belong to the king. Henry IV. gave, in 1415, to the church of Rochester, the tithe of the whales taken along the shores of that bishopric. In the sixteenth century, the inhabitants of the shores of the Bay of Biscay were the most distinguished whale-fishers. At first, they confined their attacks to those animals, probably the *Balæna rostrata* of Linnæus, which used to present themselves in the Bay of Biscay at a certain season every year. Gradually becoming bolder, the Biscayans advanced towards the coasts of Iceland, Greenland, and Newfoundland, in the pursuit. The Icelanders united their energies with the Biscayans, and conducted the whale-fishery on so extensive a scale, that, towards the end of the sixteenth century, the number of vessels annually employed by the united nations amounted to a fleet of fifty or sixty sail.

The first attempt of the English to capture the whale, of which we have any satisfactory account, was made in the year 1594. Different ships were fitted out for Cape Breton at the entrance of the Gulf of St. Lawrence, part of which were destined for the walrus-fishery, and the remainder for the whale-fishery. The Grace, of Bristol, one of these vessels, took on board 700 or 800 whale-fins, or laminæ of whalebone, which they found in the Bay of St. George, where two large Biscayan fishermen had been wrecked three years before. This is the first notice I have met with of the importation of this article into Great Britain.

However doubtful it might have appeared at one time whether the English or the Dutch first visited Spitzbergen, the claim of the English to the discovery and first practice of the whale-fishery on the coasts of these islands stands undisputed, the Dutch themselves allowing that the English preceded them four years. The merchants of Hull, who were ever remarkable for their assiduous and enterprizing spirit, fitted out ships for the whale-fishery so early as the year 1598, which they continued regularly to prosecute on the coasts of Iceland and near the North Cape for several years; and after the re-discovery of Spitzbergen by Hudson, in 1607, they were the first to push forward to its coasts. Captain Jonas Poole was, in the year 1610, sent out on a voyage of discovery by the "Company for the Discovery of unknown Countries," the "Muscovy Company," or the "Russia Company," as it was subsequently denominated. On his return, the company fitted out two ships for the fishery; the Marie Margaret, of 160 tons, under the direction of Thomas Edge, factor; and the Elizabeth, of 60 tons, Jonas Poole, master. In this voyage, both ships were lost, but the cargo was brought home in a Hull ship.

Such a novel enterprize as the capture of whales, which was rendered practical, and even easy, by the number in which they were found, and the convenience of the situations in which they occurred—an enterprize at the same time calculated to enrich the adventurers far beyond any other branch of trade then practised—created a great agitation, and drew towards it the attention of all the commercial people of Europe. With that eagerness which men invariably display in the advancement of their worldly interests, but which is seldom directed with equal vigour to objects of higher and eternal importance, the mercantile spirit was concentrated on this new quarter, and vessels from various ports began to be fitted for the fishery. In the next year, three foreign ships made their appearance along with the two belonging to the Russia Company. The English, jealous of the interference of the Dutch, would not allow them to fish, and obliged them to return home. In the following year, the English Russia Company obtained a royal charter, excluding all others, both natives and foreigners, from the fishery, and they equipped seven armed vessels for the purpose of maintaining their prerogative. In the course of the season, the English attacked the foreign vessels, and took from them the greater proportion of the blubber, or oil, and whale-fins, which they had procured, driving them, together with some English ships fitted out by private individuals, out of the country. In 1614, a company was established in Amsterdam, and a charter obtained for three years; ships of war were sent out, and the Hollanders, in defiance of the English, were able to fish without interruption.

The English got but half-laden, and the Dutch made but a poor fishing. After various disagreements, and the arrival of the vessels of other powers on the fishing-stations, which tended to divide the quarrel, a conference for the purpose of adjusting their differences ensued between the captains of the rival nations, and they agreed at length to a division of those fine bays and commodious harbours with which the whole coast of Spitzbergen abounded. The English obtained the first choice, and a greater number of bays and harbours than any of the rest. After the English, the Dutch, Danes, Hamburghers, and Biscayans, and, finally, the Spaniards and French, took up their positions. Thus we perceive the origin of the names of the different places called English Bay, Hollanders' Bay, Danes' Bay, etc.

These arrangements having been adopted, each nation prosecuted the fishery in its own possession, or along the sea-coast, which was free for all. It was understood, however, that the ships of any nation might resort to any of the bays or harbours whatever, for the convenience of awaiting a favourable wind, taking refuge from a storm, or any other emergency. To prevent the prosecution of the fishery in bays belonging to other nations, it was agreed that whenever a boat was lowered in a strange harbour, or happened to row into the same, the harpoon was always to be removed from its rest, so as not to be in readiness for use.

All the early adventurers on the whale-fishery were indebted to the Biscayans for their superintendence and help. They were the harpooners, and the coopers "skilful in setting up the staved cask." At this period, each ship carried two principals; the commander, who was a native, was properly the navigator, as his chief charge consisted in conducting the ship to and from Greenland; the other, who was called by the Dutch, specksynder, or cutter of the fat, as his name implies, was a Biscayan, and had the unlimited control of the people in the fishery, and, indeed, every operation belonging to it was entirely confided to him. When, however, the fishery became better known, the commander assumed the general superintendence, and the specksynder, or specksioneer, is now the principal harpooner, and has the "ordering of the fat," and the extracting or boiling of the oil of the whale, but serves under the direction of the commander.

The Dutch pursued the whale-fishery with more vigour than the English, and with still better effect. It was no uncommon thing for them to procure such vast quantities of oil that empty ships were required to take home the superabundant produce. In 1622, the charter of the Amsterdam Company was renewed for twelve years, and the charter of the Zealand Society was extended about the same time, whereby the latter were allowed to establish themselves in Jan Mayen Island, and to erect boiling-houses and cooperages in common with their associates. The privileges of these companies, occasioning the exclusion of all other persons belonging to the United Provinces, produced a considerable degree of discontent, when the fishery, towards the expiration of these last charters, was in its most flourishing state. The states-general of Friesland were induced to grant a charter to a company formed in that province, which endowed them with similar privileges to those of the other companies of Holland. The Frieslanders, in the year 1634, perceived the advantage of procuring the sanction of the Zealand and Amsterdam companies to their right to participate in the fishery, and after negotiation, the three companies, according to stipulated conditions, contracted a triple union. The Dutch followed the whale-fishery with perseverance and profit, and were successfully imitated by the Hamburghers and other fishermen of the Elbe, but the English made only occasional voyages.

It became apparent to the adventurers in the whale-fishery, that considerable advantages might be realized could Spitzbergen be resorted to as a permanent residence, and they were desirous of ascertaining the possibility of the human species subsisting throughout the winter in this inhospitable climate. The English merchants offered considerable rewards, and the Russia Company procured the reprieve of some culprits who were convicted of capital offences, to whom they promised pardon and a pecuniary remuneration if they would remain a single year in Spitzbergen. The fear of immediate death induced them to comply; but when they were carried out and showed the desolate, frozen, and frightful country they were to inhabit, they shrank back with horror, and solicited to be returned home to suffer death in preference to encountering such appalling dangers. With this request the captain who had them in charge humanely complied, and on their return to England the company interceded on their behalf, and procured pardon.

Probably it was about the same time that nine men, who were by accident separated from one of the London fishing-ships, were left behind in Spitzbergen; all of them perished in the course of the winter, and their bodies were found in the ensuing summer shockingly mangled by beasts of prey. The same master who abandoned these poor wretches to so miserable a fate was obliged, by the drifting of the ice towards the shore, to leave eight of his crew, who were engaged in hunting reindeer for provision for the passage home, in the year 1630. These men, like the former, were abandoned to their fate; for on proceeding to the usual places of resort and rendezvous, they perceived with horror that their own, together with all the other fishing-ships, had departed. By means of the provisions procured by hunting, the fritters of the whale left in boiling the blubber, and the accidental supplies of bears, foxes, seals, and sea-horses, together with the judicious application of the buildings which were erected in Bell Sound, where they took up their abode, they were enabled not only to support life, but even to maintain their health little impaired, until the arrival of the fleet in the following year. It is surely permitted us to hope, that amidst the retirement and dreariness of these frozen regions, these hardy sailors found opportunities for serious reflection and prayer to the God of heaven, and that their minds, with eternity so near to them, were sufficiently acquainted with the one way of salvation to yield themselves to Him who is able to preserve his servants unto life eternal.

The preservation of these men revived in the Dutch the desire of establishing colonies, and in consequence of certain encouragements proclaimed throughout the fleet, seven men volunteered their services, were landed at Amsterdam Island, furnished with the needful articles of provisions, etc., and were left by the fleet on the 30th of August, 1633. About the same time, another party, likewise consisting of seven volunteers, were landed on Jan Mayen Island, and left by their comrades to endure the like painful service with the former. On the return of the fleet in the succeeding year, this last party were all found dead from the effects of the scurvy; but the other, which was left in Spitzbergen, nine degrees further towards the north, all survived. Other seven volunteers proposed to repeat the experiment in Spitzbergen during the ensuing winter, and were quitted by their comrades on the 11th of September, 1634. They all fell victims to the scurvy.

The Dutch, encouraged by the hope that the profitable nature of the whale-fishery would continue unabated, incurred very great expenses in making secure, ample, and permanent erections, which they gradually extended in such a degree that at length they assumed the form of a respectable village, to which, from the Dutch words "smeer," signifying fat, and "bergen," to put up, they gave the name of Smeerenberg. Their expectations of continued success were not, however, justified, and the fishery began to decline so rapidly from the year 1636–7, to the termination of the company's charters, that their losses are stated on some occasions to have exceeded their former profits. On the expiration of the charters, in the year 1642, their renewal was refused by the states-general, and the trade was laid entirely open to all adventurers. It increased in consequence almost tenfold; and on the dissolution of the monopoly, the shipping in the whale-fishery commerce accumulated to between two and three hundred sail. Prior to the time when the trade was laid open, the Jan Mayen whale-fishery, like that of Spitzbergen, attained its maximum. The prodigious destruction of whales occasioned their withdrawal, and the island was at length abandoned as a whale-fishing station.

The whale-fishery of the Dutch was somewhat suspended by the war with England in 1653; but between the years 1660 and 1670, four or five hundred sail of Dutch and Hamburgh ships were yearly visitants to the coasts of Spitzbergen, while the English sometimes did not send a single ship. The British government saw with regret such a profitable and valuable speculation entirely laid aside. To encourage, therefore, its renewal, an Act of Parliament was passed in 1672, whereby the rigours of the Navigation Act were dispensed with, and its essential properties so modified for the ten following years that a vessel for the whale-fishery, being British-built, and having a master and one-half of the crew British subjects, might carry natives of Holland, or other expert fishers, to the amount of the other half. In the year 1693 was formed the "Company of Merchants of London, trading to Greenland," to whom was granted an extension of the indulgences allowed by this Act of Parliament. From various losses, combined, probably, with unskilful management, this company was so unfortunate that, before the conclusion of their term, their capital of £82,000 was entirely expended. These circumstances tended much to discourage the subjects of Great Britain from making any vigorous attempt to renew the fishery. The direct importation of Greenland produce into England being inconsiderable, its importation from Holland or other foreign states was permitted; whalebone, however, was required to be brought into the country in fins only, and not cut, or in any way manufactured; nor could it be landed before the duty chargeable thereon was secured or paid, under penalty of the forfeiture of the goods and double their value. Immense sums were annually paid to foreigners for whalebone at this period.

It was not, it appears, until the whale-fishery was on the decline at Spitzbergen, that the Davis's Strait fishery was resorted to. The Dutch sent their first ships in the year 1719. The shipping employed in the Greenland and Davis's Strait whale-fisheries, in 1721, by foreign nations, amounted to three hundred and fifty-five sail. When, by the lapse of some years, the unfavourable impression produced on the minds of speculative persons by the immense losses suffered by English adventurers in the whale-fishery had partly worn off, the propriety of attempting this trade was suggested by Henry Elking, and was proposed to the directors of the well-known South Sea Company. The British legislature, by exempting the produce of the Greenland Seas from existing duties on the condition of its being imported in British ships, held out encouragements to the company similar to those offered to former adventurers. The South Sea Company caused a fleet of twelve new ships, about 306 tons' burden each, to be built in the river Thames, equipped each vessel with the necessary supplies of cordage, casks, and fishing instruments, and engaged for their use the duke of Bedford's wet-dock at Deptford, where boiling-houses and other conveniences were constructed. In the spring of 1725, the fleet being all in readiness, put to sea, and returned safe with twenty-five and a half whales. The proceeds of this voyage, though scarcely sufficient to pay the expenses incurred by the fitments and the hire of foreign harpooners, were yet superior to those of any succeeding year during the period in which the company pursued the trade. For eight successive years the company persevered in the whale-fishery, with indifferent or bad success, and after the season of 1732 were compelled to abandon it. In 1736, a London ship, which visited the whale-fishery, procured a cargo of seven fish—a degree of success which was fortunately different from that of most of the antecedent English whalers. The English government offered a bounty of twenty shillings per ton on the burden or tonnage of all British whale-fishing ships of 200 tons or upwards; and this, in 1749, was increased to forty shillings per ton.

Gradually the British whale-fishery began to assume a respectable and hopeful appearance. The combined fleets of England and Scotland, in the year 1752, amounted to forty sail; in 1753, to forty-nine; in 1754, to sixty-seven, in

1755, to eighty-two; and in the year following, to eighty-three sail—which was the greatest number of ships employed in the trade for the twenty years following; while the least number amounted to forty sail during the same period. On the establishment of the British whale-fishery, the legislature directed its attention to the means for securing the perpetuity of the trade, and the economical application of the bounty. These enactments were not carried in the House of Commons without considerable debate. In 1768, the king of Prussia, interesting himself in the Greenland fishery, caused some ships to be equipped from Embden; and in 1784, the king of France attempted the revival of the whale-fishery, by equipping, at his own expense, six ships in the port of Dunkirk. In 1785, the king of Denmark, in imitation of the English, granted a bounty of about thirty shillings sterling per ton, to all vessels in the Greenland and Iceland fisheries, on the condition of the ships being fitted out and their cargoes sold in a Danish port.

The Act of the British Parliament of 1786, embodying several additional regulations on the subject of the whale-fishery, and rehearsing and revising former acts, has ever since been considered the fundamental act on the subject of the Greenland and Davis's Strait whale-fishery. By accounts laid upon the table of the House of Commons during this session, it appeared that the bounties granted for the encouragement of the British whale-fisheries, carried on in the Greenland Sea and Davis's Strait, from the year 1733, when bounties were first given, to the end of 1785, had amounted to £1,064,272. 18*s.* 2*d.* for England, and £202,158. 16*s.* 11*d.* for Scotland. By a subsequent act, the bounty was reduced to twenty-five shillings per ton, from the 25th of December, 1792, to the 25th of December, 1795; and from this period until the expiration of the act in 1798, to twenty shillings per ton, at which latter rate it has continued ever since. From a list, it appears, that in 1788, 255 British ships sailed for the whale-fishery, of which 129 were of a burden under 300 tons; 97 of 300 to 350 tons; 16 of 350 to 400 tons; 11 of 400 to 500 tons; 1 of 565 tons; and 1 of 987 tons. They were fitted out from the ports of London, Hull, Liverpool, Whitby, Newcastle, Yarmouth, Sunderland, Lynn, Leith, Ipswich, Dunbar, Aberdeen, Bo'ness, Glasgow, Montrose, Dundee, Exeter, Whitehaven, Stockton, Greenock, Scarborough, Grangemouth, and Queensferry.

CHAPTER II.

SITUATION OF THE EARLY WHALE-FISHERY—THE MANNER IN WHICH IT WAS CONDUCTED—AND THE ALTERATIONS WHICH HAVE TAKEN PLACE.

IMMEDIATELY after the discovery of Spitzbergen by Hudson, in the year 1607, the walrus-fishers, who carried on an extensive and profitable business at Cherie Island, finding the animals of their pursuit become shy and less abundant, extended their voyage to the northward, until they fell in with Spitzbergen, the newly discovered country, about the time when the Russian Company equipped their first ships for the Greenland whale-fishery. As the coast abounded with whales and sea-horses, Cherie Island was deserted, and Spitzbergen became the scene of future enterprize. At this time, the mysticetus was found in immense numbers throughout the whole extent of the coast, and in the different capacious bays with which it abounds. Never having been disturbed, these animals were unconscious of danger; they allowed themselves to be so closely approached that they fell an easy prey to the courageous fishermen. It was not necessary that the ships should cruise abroad, throughout the extended regions of the Polar Seas, as they do at the present time, for the whales being abundant in the bays, the ships were anchored in some convenient situation, and generally remained at their moorings until their cargoes were completed. Not only did the coast of Spitzbergen abound with whales, but the shore of Jan Mayen Island, in proportion to its extent, afforded them in like abundance.

The method used for capturing whales, at this period, was usually by means of the harpoon and lance, though the Dutch inform us that the English made use of nets made with strong ropes for the purpose. The harpoon, which was the instrument used in general practice for effecting their entanglement, consisted, as at present, of a barbed or arrow-shaped iron dart, two or three feet in length, to which was attached a wooden handle, for convenience in striking or throwing it into the whale. Fastened to the harpoon was a line or rope three hundred fathoms in length; more than sufficient to reach the bottom in the bays, where the depth of the water seldom exceeds eighty or one hundred fathoms; so that on a fish descending after being struck, the end of the line could always be detained in the boat. The movements of this boat, of course, corresponded with those of the whale; and so closely pointed out its position, that, on its reappearance at the surface, the other assisting boats were usually very near the place. It was then vigorously pursued, secured by a sufficient number of harpoons, and lastly attacked repeatedly with lances until it was killed.

The lance in use was an iron spear with a wooden handle, altogether ten or twelve feet in length. The capture of the fish, in which, owing to the particular excellence of the situation, they seldom failed, being accomplished, it was towed by the boats, rowing one before another " like a team of horses," to the ship's stern, where it lay untouched from one to two or three days. The fat being then removed was carried to the shore, where ample conveniences being erected, it was afterwards subjected to heat in a boiler, and the greater part of the oil extracted.

As the usual process of the early fishers for extracting the oil may be interesting to some readers, I shall attempt to describe it, following the accounts by captains Anderson and Gray, whose papers are preserved among the manuscripts in the British Museum.

The blubber being made fast to the shore, a " waterside man," standing in a pair of boots, mid-leg in the sea, flayed off the fleshy parts, and cut the blubber into pieces, of about two hundred weight each. Two men, with a barrow, then carried it, piece by piece, to a stage or platform, erected by the side of the works, where a man, denominated a " stage-cutter," armed with a long knife, sliced it into pieces, one and a half inches thick, and about a foot long, and then pushed it into an adjoining receptacle, called a "slicing cooler." Immediately beyond this cooler, five or six choppers were arranged in a line, with blocks of whales' tails before them; and adjoining these blocks was another vessel, called a "chopping cooler," of two or three tons' capacity. These men, being situated between the two coolers, took the sliced blubber from the slicing cooler, and, after reducing it into little bits, scarcely one-fourth of an inch thick, and an inch or two long, pushed it into the chopping cooler. These operations were carried on as near as convenient to the place where the copper was erected.

The copper held only half a ton. It was furnished with a furnace, and the requisite appendages. A man, designated "tub-filler," with a ladle of copper, was employed in filling a hogshead with chopped blubber, dragging it to the copper, and emptying it in, until the copper was full. A fire of wood was, in the first instance, applied, but after a copper or two had been boiled, the finks or fritters were always sufficient to boil the remainder without any other fuel. When the blubber was sufficiently boiled, two men, called "copper men," with two long-handled copper ladles, took the oil and finks out of the copper, and put it into a "fritter barrow," which, being furnished with a grating of wood in place of a bottom, drained the oil from the fritters, from whence it ran into a wooden tank or cooler, of about five tons' capacity. Three coolers were usually provided, and placed some feet asunder, a little below each other; a quantity of water was put into each before the oil, and the oil, whenever it came to a certain height in the first cooler, escaped through a hole, by a spout, into the second, the same way into the third, and from thence, by a plug-hole, into the casks or butts in readiness for its reception. When the oil in these butts was thoroughly cold, whatever it had contracted was filled up, and the casks then rolled into the water, and, in rafts of twenty together, were conveyed into the ship.

The whalebone was separated from the gum, or substance in which it is imbedded, rubbed clean, packed in bundles, of sixty laminæ or blades each, and taken to the ship in the long-boat. Thus prepared, the cargo was conveyed home, either when a sufficiency was procured, or the close of the season put an end to the fishing occupations. While some of the people belonging to the whale-ships were engaged in boiling the blubber, the rest of the crew, it is probable, were occasionally employed in the capture of other whales. Besides the buildings made use of in boiling the blubber, the whale-fishers had other buildings on shore for lodging the blubber-men in, and for the use of the coopers employed in preparing the casks.

So long as the whales remained in the immediate vicinity of the fishing establishments, the boats were sent out of the bay, the fish captured at sea, towed into the harbour, stripped of the fat, and the blubber boiled in the manner described; but as the whales increased their distance, this plan of procedure became inconvenient, so that the ships began to cruise about the sea, to kill the whales wherever they found them, to take on board the blubber, and only occasionally to enter a port. So far now from having occasion for empty ships for carrying away the superabundant produce, it was a matter of difficulty and uncertainty to procure a cargo at all; and, with the most prosperous issue, there was not sufficient time for landing the cargo and extracting the oil; the blubber was therefore merely packed in casks and conveyed home, where the remaining operations of extracting the oil, and cleaning and preparing the whalebone, were completed. Hence, the various buildings, which had been erected at a great expense, became perfectly useless; the coppers, and other apparatus that were worth the removal, were taken away, and the buildings of all the different nations, both at Spitzbergen and at Jan Mayen Island, were either wantonly razed to the ground, or suffered to fall into a state of decay.

When the whales first approached the borders of the ice, the fishers held the ice in such dread, that whenever an entangled fish ran towards it, they immediately cut the line. Experience, through time, inured them to it; occasionally they ventured among the loose ice, and the capture of small whales at fields was at length attempted, and succeeded. Some adventurous persons sailed to the east side of Spitzbergen, where the current, it is believed, has a tendency to turn the ice against the shore; yet here, finding the sea, on some occasions, open, they attempted to prosecute the fishery, and, it seems, with some success, a great whale-fishery having been made near Stansforeland, in the year 1700. The retreat of the whales from the bays to the sea-coast, thence to the banks at a distance from land, thence to the borders of the ice, and finally to the sheltered situations afforded by the ice, appears to have been fully accomplished about the year 1700, or from that to 1720. The plan of prosecuting the fishery now underwent a material change, especially in reference to the construction of the ships, and the quality and quantity of the fishing apparatus.

When the fishery could be effected entirely in the bay, or even along the sea-coast, any vessels which were sea-worthy, however old or tender, were deemed sufficient to proceed to Spitzbergen, and were generally found adequate to the purpose, especially as they did not set out till the spring was far advanced, thereby avoiding obstructions from the ice and from sudden and destructive storms. When, however, the fishing had to be pursued in the open sea, new, or at least very substantial ships, became requisite, and even these it was found necessary to strengthen on the bows and stern, and on the sides, by additional planks. A greater quantity of fishing-stores also became needful. When fishing among the ice, the whales, after having been struck, frequently penetrated to a great distance out of the reach of their assailants, dragging the line away, until at length they found it necessary to cut it to prevent further loss. Hence, by the frequency of disasters among their ships, the increased expense of their equipment, and the liability of losing their fishing-materials, such an additional expense was occasioned as required the practice of the most rigid economy to counterbalance it. The destruction of the shipping by the ice, in the Dutch fleet alone, was frequently near twenty sail in one year, and on some occasions above that number. The Greenland men of the present day being mostly ice-fishers, an account of the improved mode of fishing now practised will be sufficient for the illustration of the method followed by the Dutch and other nations at a more early period, particularly as the way in which the whale is pursued and killed is pretty nearly the same at this time as it was a hundred years ago.

Davis's Strait, or the sea lying between the west side of Old Greenland and the east side of

North America, and its most northern islands, has generally, since the close of the seventeenth century, been the scene of an advantageous whale-fishery. This fishery was first attempted by the Dutch, in 1719; after which period it was usually resorted to by about three-tenths of their whalers, while seven-tenths proceeded to Spitzbergen. This fishery differs only from that of Spitzbergen or Greenland, in the sea being, in many districts, less incommoded with ice, and in the climate being somewhat more mild. The alterations which have taken place in it are, in some measure, similar to those which have occurred at Spitzbergen. The fish which, half a century ago, appear to have resorted to all parts of the western coast of Old Greenland, in a few years retired to the northward, but they still remained about the coast. Of late, however, they have deserted some of the bays which they formerly frequented, and have been principally caught in icy situations in a high latitude, or in the opening of Hudson's Strait, or at the borders of the western ice, near the coast of Labrador.

Baffin's Bay was suggested as an excellent fishing-station, by the voyager whose name it bears, so early as the year 1616, when his memorable navigation was performed. Baffin, in a letter addressed to J. Wostenholm, esq., observes, that great numbers of whales occur in the bay, and that they are easy to be struck; and, though ships cannot reach the proper places until toward the middle of July, "yet they may well tarry till the last of August, in which space much business may be done, and good store of oil made." To this situation, where the whales have never been molested until recently, it appears they still resort in the same manner, and in similar numbers, as in the time of Baffin. In 1817, two or three of the Davis's Strait whalers proceeded through the strait into Baffin's Bay, to a much greater length than they were in the habit of adventuring, where, in the months of July and August, they found the sea clear of ice, and in some parts abounding with whales. A Leith ship, which, it appears, advanced the furthest, made a successful fishery in lat. 76°–77°, after the season when it was usual for ships to depart. This fact having become generally known, several other ships followed the example, in the season of 1818, and persevered through the barrier of ice lying in 74°–75° towards the north. After they had succeeded in passing this barrier, they found, as in the preceding year, a navigable sea, where several ships met with considerable success in the fishery, at a very advanced period of the season. This discovery is likely to prove of great importance to the fishery of Davis's Strait. Ships, which fail of success in the old stations, will still, in the new fishery, have a reserve of the most promising character. Hence, instead of this fishery being necessarily closed in July, the period when the whales have usually made their final retreat from the old fishing-stations, it will in future be extended to the end of August at least ; and it may ultimately appear that there will be little danger of ships being permanently frozen up, unless previously beset in the ice during any part of the month of September.

CHAPTER III.

ACCOUNT OF THE MODERN WHALE-FISHERY, AS CONDUCTED AT SPITZBERGEN.

We commence this chapter with a description of a well-adapted Greenland ship, and of the manner in which it should be strengthened to resist the concussions of the ice. A ship intended for the Greenland or Davis's Strait trade, should be of three or four hundred tons' admeasurement, very substantially built, doubled, and fortified; should have six or seven feet perpendicular space between decks; should be furnished with a description of sails which are easily worked; and should possess the property of fast sailing. The most appropriate dimensions of a ship intended for the northern whale-fisheries, seems to be that which is so large as to be capable of deriving the greatest advantage from the best opportunity, and no larger. A vessel of 250 tons requires nearly the same number of men, the same quantity of provisions and stores, and the same expense of outfit, as a ship of 350 tons' burden; while the difference in the cargoes of the two vessels when filled, is in one voyage more than a compensation for the difference in the first expense. Besides, for want of similar room and convenience, the smaller ship has not always an equal chance of succeeding in the fishery with the larger. And, as ships of about 350 tons' burden have been occasionally filled, vessels of 250 tons are too small for the fishery. Ships of 350 tons' burden have, we observe, been occasionally filled, but we know of no instance in which a ship of 400 tons, of the usual capacious build, has been deficient in capacity for taking in as large a cargo as of late years there has been any opportunity of procuring. We therefore conclude, that an increase of dimensions above 400 tons is an actual disadvantage, and that a ship of intermediate size, between 300 and 400 tons, is best adapted for the fishery.

Greenland ships, in the early ages of the fishery, were very indifferent structures, and even of late shipping of inferior quality were generally deemed sufficient for the trade. At present, however, when a good fishery is rarely made without frequent exposure to the ice, and sometimes in very critical situations, the vessels require to be substantially built, for the purpose of resisting the occasional pressure of, and frequent blows from, the ice, to which the ships of persevering fisherm n must always be more or less exposed. The requisites peculiar to a Greenland ship, the intention of which is to afford additional strength, consist of doubling, and sometimes trebling, and fortifying. The terms "doubling" and "trebling," are expressive of the number of layers of planks, which are applied to the exterior of a frame of timbers; hence, a ship which has one additional series of planks, is said to be doubled, and such ships as are furnished with two, or part of two, additional layers of planks, are said to be trebled. Doubling generally consists of the application of two or two half inches oak plank, near the bow, diminishing towards the stern to perhaps half that thickness, and extending in one direction from the lower part of the main-wales, to within six feet perpendicular of the keel forward, and to within eight or nine feet abaft; and, in the other direction, that is, fore and aft-wise, from the stem to the stern-post. Doubling is used for producing an increase of strength, and at the same time for preserving the outside or main planks of the ship from being injured by the friction of passing ice. Trebling, which commonly consists of one and a half to two inches oak plank, is generally confined to the bows of the ship, and rarely extends farther aft than the fore-chains or chess-tree. It is seldom applied but to second-rate ships. Its principal use is to increase the strength of the ship about the bows, but it also serves to preserve that part of the doubling which it covers from being destroyed by the ice.

Fortifying is the operation of strengthening a ship's stern and bows by the application of timber and iron plates to the exterior, and a vast number of timbers and stanchions to the interior. Four straight substantial oak timbers, called ice-beams, about twelve inches square and twenty-five feet in length, are placed beneath the hold-beams, butting with their foremost extremity against a strong fore-hook, and extending nearly at right angles across three or four of the hold-beams, into each of which they are notched and secured, at the point of inter section, by strong iron bolts, with the addition of "cleats" on the aftermost-beams. The fore-part of the ice-beams, which butt against the hook, are placed at a small distance from each other, from whence they diverge in such a way that their other extremities divide the aftermost beams under which they pass into five equal parts. The next important part of the fortification is the *pointers*, which consist of four or more crooked timbers, fitting the curve of the ship's bow on each side; these are placed below the hold-beams, against the inside of the ceiling, nearly parallel with the direction of the planks, some butting against the fore-hooks, and others passing between them. Across these pointers, four or five smaller timbers, called "riders," disposed at regular distances, are placed at right angles, that is, in the same direction as the ribs of the ship. Now, from each of the points of intersection of the riders and pointers, consisting of eighteen or twenty on each side of the ship, a stanchion, or shore, proceeds to the edge of one of the two ice-beams, placed on the same side, where it is secured in a rabbet. The ice-beams are supported and connected by several strong pieces of wood, placed between each two, in different parts, called "carlings," whereby they are made to bear as one. It is evident that a blow received on the starboard-bow will be impressed on the adjoining pointers, and the impression communicated, through the medium of the lateral timbers, or shores, to the two ice-beams on the same side, thence by the carlings to the other ice-beams, and then, by the shores on the opposite side to the larboard-bow and annexed pointers. A blow cannot be received on any part of one bow, without being communicated by the fortification to every part of the opposite bow, while every part to and through which the impression is communicated must tend to support that place on which the blow is impressed.

To preserve the stem from being shattered or bruised by direct blows from the ice, it is strengthened by an extra piece called the false, or ice-stem. On the side of this are placed the ice-knees, which are angular chocks, or blocks of wood, filling the concavity formed by the stem and bow planks, and extending from about the eight feet mark to the loading mark. In the best style, the ice-knees are twelve to fifteen inches in thickness at the stem, diminishing to, perhaps, six or eight inches thick at the distance of about eight feet from the stem, from thence gradually becoming thinner, until they fall into and incorporate with the common doubling, below the fore-part of the fore-chains. This makes a neat bow, and in point of strength is much preferable to the angular chocks or knees, which usually extend about five or six feet from the stem, and then terminate somewhat abruptly upon the doubling. Ice-knees not only strengthen the front of the bows, and prevent the main planks from being bruised or shattered, as far as they extend, but likewise protect the stem from the twisting effect of a side blow. The stem and the small part of the ice-knees adjoining, are still farther defended by plates of half-inch iron, called ice-plates, which are nailed upon the face of the ice-stem, and partly on the ice-knees, to prevent them being cut by the ice.

For additional strength, as well as convenience, the hold-beams of a Greenland ship should be placed low, or at a greater distance from the deck-beams than is usual in other merchantmen, leaving a clear space of six or seven feet between decks. The strength thus derived is principally serviceable when the ship is squeezed between two sheets of ice; because the nearer the pressure acts on the extremities of the beams, the greater is the resistance they are calculated to offer. A large space between decks is found also, for many reasons, to be most convenient.

Hammocks, as receptacles for sailors' beds, being incommodious, the crew are lodged in cabins or berths, erected in the half-deck; these consist of twelve to twenty in number, each of which is calculated to contain two or three persons. When a ship is on fishing-stations, the boats are required to be always ready for use; as such they are suspended from cranes, fixed on the sides of the ship, and are usually so contrived that a boat can be lowered down into the water, manned, and pushed off from the ship, in the short space of a minute of time. Prior to the year 1813, a ship having seven boats carried one at each waist, that is, between the main-mast and fore-mast, two at each quarter, one above the other and one across the stern. An improvement on this plan, adopted in 1813, is to have the boats fixed in a line of three lengths of boats on each side.

The masts and sails of a Greenland vessel are not without their peculiarities. As it is an object of importance that a fishing-ship should be easily navigated, under common circumstances, by a boat's crew of six or seven men, it is usual to take down royal masts, and even top-gallant masts, and sometimes to substitute a long light pole in place of a mizen top-mast; also, to adopt such sails as require the least management. Courses set in the usual way require a number of men to work them when the ship is tacked; a course, therefore, made to diminish as it descends, that is, narrowest at the foot or lower part, and extended by a boom or yard below as well as above, and this boom fastened by a tackle fixed at its centre to the deck, swings with the yards, with little or no alteration, and is found particularly convenient. Foresails, on this principle, have been in use about six or seven years. In 1816, I fitted a mainsail or cross-jack, in the same way, the former of which we found of admirable utility. Boom-courses are not only convenient in tacking, but are likewise a valuable acquisition when sailing among crowded dangerous ice. As the safety of the ship depends, next to the skilfulness of the piloting officer, on a prompt management of the yards and sails, boom-courses are strikingly useful on account of the little attention they require when any alteration in the position of the sails becomes neccessary; and when the ship's head-way is required to be suddenly stopped in a situation where she cannot be luffed into the wind, boom-courses swinging simultaneously with the top-tails are backed without any annoyance from tacks or sheets, and of course assist materially in effecting the intention. Such is the advantage of this description of sails, that on one occasion, when all the rest of my crew were engaged in the capture of a whale, with the assistance of only two men, neither of them sailors, I repeatedlv tacked a ship of 350 tons' burden under three courses, top-sails and top-gallant sails, together with jib and mizen, in a strong breeze of wind. Gaf-sails between the masts, in the place of stay-sails, are likewise deservedly in much repute. To the mizen and try-sail, or gaf main-sail, that have been long in use, I have added a gaf fore-sail of similar form, besides which, my father has also adopted gaf top-sails between each mast. These sails produce an admirable effect when a ship is "on a wind," which is the kind of sailing most required among the ice.

Having now described a Greenland ship, it is time to detail the proceedings on board of her, from putting to sea to her arrival on the coast of Spitzbergen. When all necessary conditions have heen fulfilled, and the ship cleared out at the custom-house, the first opportunity is embraced for putting to sea. This is generally accomplished in the course of the month of March, or at least before the tenth of April. The crew of a whale-ship usually consists of forty to fifty men, comprising several classes of officers, such as harpooners, boat-steerers, line-managers, carpenters, coopers, etc., together with fore-mast men, landmen, and apprentices. As a stimulus to the crew in the fishery, every individual, from the master down to the boys, besides his monthly pay, receives a gratuity for every size fish caught during the voyage, or a certain sum for every tun of oil which the cargo produces. Masters and harpooners, in place of monthly wages, receive a small sum in advance before sailing, and if they procure no cargo whatever, they receive nothing more for their voyage ; but in the event of a successful fishing, their advantages are considerable. The master usually receives three guineas for each size fish, and as much for striking a size whale or discovering a dead one, together with ten shillings to twenty shillings per tun on oil, and commonly a thirtieth, a twenty-fifth, or a twentieth of the value of the cargo besides. He also has about £5 per month for his attendance on the ship while he remains on shore. Each harpooner has usually 6*s*. per tun on oil, together with half a guinea for every size fish he may strike during the voyage. In addition to which the chief-mate, who is generally also harpooner, has commonly two guineas per month when at sea, and a guinea for each size fish. The specksioneer, or chief-harpooner, has also half a guinea per fish, and sometimes a trifle per tun of oil additional ; and the second-mate, and other officers who serve in a compound capacity, have some additional monthly wages. Boat-steerers, line-managers, and foremast-men, commonly receive about 1*s*. 6*d*. per tun each, besides their monthly pay, and landmen either a trifle per tun on oil, or a few shillings for each size fish.

From the difference in the wages paid in different ports, it is not easy to say what is the amount received by each class of officers belonging to the whale-ships. In the general, however, it may be understood that, on a ship with 200 tuns of oil, which is esteemed an excellent cargo, the chief-mate receives about £95 for his voyage, a harpooner about £70, and a common sailor, or foremast-man, about £25. including advance money and monthly pay. As the master's wages depend as much on the value of the cargo as upon its quantity, it is difficult to give an opinion as to the amount; generally speaking, however, with a cargo of 200 tuns of oil, he will receive about £250 or £300, when his pay is according to the lowest scale; and perhaps £500 or £600, or upwards, when he is paid after the highest rate.

In time of war, the *manning* of the whale-ships at the ports where they were respectively fitted out being sometimes impracticable, and always a matter of difficulty, it was usual for the owners and masters of such ships to avail themselves of the privileges allowed by act of parliament of completing their crews in Shetland and Orkney. These islands were, therefore, the frequent resort of most of the fishermen; those bound for Spitzbergen commonly put into Shetland, and those for Davis's Strait into Orkney. But in the present time of peace, also, several ships, in consequence of the higher wages demanded by the English seamen, have availed themselves of a late extension of the act for permitting a certain amount of extra men to be taken on board in Shetland or Orkney, during the continuance of the bounty system.

In Shetland, it is usual for the fishermen to *trim* their ships, and complete their ballast, by filling most of their empty casks with water, where it has not previously been done, to replenish their fresh water, to lay in stocks of eggs, fish, fowls, sea-sand, etc., to divest the ships of all elevated lumber and gaudy appendages to the masts and rigging, by way of preparing them for enduring the Polar storms with greater safety and convenience, and lastly, to fix a "crow's nest" or "hurricane house," on the mast of each ship, and prepare a passage to it as safe and convenient as possible.

The "crow's nest" is an apparatus placed on the main top-mast, or top-gallant mast-head, as a kind of watch-tower for the use of the master or officer of the watch in the fishing-seas, for sheltering him from the wind, when engaged in piloting the ship through crowded ice, or for obtaining a more extensive view of the sea around when looking out for whales. When sailing among much drift-ice, as seen from the deck, it seems at a small distance impervious, although it may happen that scarcely any two pieces are connected; but from the mast-head, the relative position of almost every piece may be distinctly seen, and an opinion may be formed by the experienced observer of the probable and actual movements of such pieces as the ship is required to pass. This is an object of the greatest importance, because the varied movements of the different pieces occasion such an alteration in the channel pursued, that, were it not for a constant, attentive, and judicious watch by the master or an able officer, a ship would not pass through any crowded collection of drift-ice without the imminent risk of being stove.

In difficult situations, a master's presence at the mast-head is sometimes required for many hours in succession, when the temperature of the air is from 10° to 20° below the freezing point, or more. It is therefore necessary for the preservation of his health, as well as for his comfort, that he should be sheltered from the piercing gale. A piece of canvas tied round the head of the main top-mast, and heel of the top-gallant mast, extending only from the cap to the cross-trees, or at best, a canvas stretched round the base of the top-gallant rigging, but open on the after-part, was the most complete contrivance of a crow's nest, until a few years ago my father invented an apparatus, having the appearance of a rostrum, which afforded an admirable defence against the wind. This contrivance, from the comfortable shelter it affords to the navigator, having come into very general use, it may not be improper to describe it more particularly.

The one most approved by the inventor is about four and a half feet in length, and two and a half in diameter. The form is cylindrical, open above and close below. It is composed of laths of wood, placed in a perpendicular position, round the exterior edge of a strong wooden hoop, forming the top, and round a plane of mahogany or other wood which forms the bottom, and the whole circumference of the cylinder is covered with canvas or leather. The entrance is by a trap-hatch at the bottom. It is fixed on the very summit of the main top-gallant mast, from whence the prospect on every side is unimpeded. On the after-side is a seat, with a place beneath for a flag. In other parts are receptacles for a speaking-trumpet, telescope, and occasionally for a rifle-piece, with utensils for loading. For the more effectual shelter of the observer, when in an erect posture, a movable screen is applied to the top on the windward side, which increases the height so much as effectually to shield his head. When the ship is tacked, nothing more is necessary for retaining the complete shelter than shifting the screen to the opposite side, which is done in an instant.

The Greenland ships usually leave Shetland towards the end of March, or the beginning of April. From thence, if their view be to avail themselves of the benefit of the seal-fishery, they steer to the northward, on the meridian, or a little to the westward, and commonly make the ice in the latitude of 70° to 72° north. But if the month of April be much advanced before they leave Shetland, they generally steer for the whaling-stations on a course to the east of north, with the view of falling into that remarkable indentation of the Polar ice, lying in 5° or 10° east longitude, which I have denominated the "Whale-Fishers' Bight." It used to be the practice to remain on sealing-stations until the beginning of May, and not to enter the ice until about the middle of the month; but of late it has become usual to push into the ice at a much earlier period, though the practice is neither without its dangers nor disadvantages. If a barrier of ice prevents the fisher from reaching the usual fishing-station, he sometimes perseveres in search of whales on the southward margin of the ice, but more generally endeavours to push through it into an opening, which is usually formed on the west side of Spitzbergen, in the month of May, where he seldom fails of meeting with the objects of his search. It is a common remark, that the more difficulty there is attending the passage through the ice, the better is the fishery when that passage is accomplished. In close seasons, very few ships pass the barrier before the middle or end of May. Those which first succeed immediately proceed along the edge of the western ice to the latitude of 78° or 79°, until they meet with whales. But in open seasons, the most recommendable plan is to sail direct to the latitude of 80°, when it can be accomplished at a very early period, where large whales are generally at this season to be found.

It is not yet ascertained what is the earliest period of the year in which it is possible to fish for whales. The danger attending the navigation amidst massive drift-ice, in the obscurity of night, is the most formidable objection against attempting the fishery before the middle of the month of April, when the sun, having entered the northern tropic, begins to enlighten the Polar regions throughout the twenty-four hours. Some ships have sailed to the northward of the 78th degree of latitude, before the close of the month of March; but I am not acquainted with a single instance where the hardy fishers have, at this season, derived any compensation for the extraordinary dangers to which they were exposed. In the course of the month of April, on certain occasions, considerable progress has been made in the fishery, notwithstanding the frequency of storms. At the first stage of the business, in open seas, the whales are usually found in most abundance on the borders of the ice, near Hackluyt's Headland, in the latitude of 80°. A degree or two further south they are sometimes seen, though not in much plenty; but in the 76th degree they sometimes occur in such numbers, as to present a tolerable prospect of success in assailing them.

Some rare instances have occurred wherein they have been seen on the edge of the ice, extending from Cherie Island to Point Look-out, in the early part of the season. Grown fish are frequently found at the edge, or a little within the edge, of the loose ice, in the 79th degree of north latitude, in the month of May;

and small whales, of different ages, at fields, and sometimes in bays of the ice, in the 80th degree. Usually the fish are most plentiful in June, and, on some occasions, they are met with in every degree of latitude from 75° to 80°. In this month, the large whales are found in every variety of situation; sometimes in open water, at others in the loose ice, or at the edges of fields and floes, near the main impervious body of ice, extending towards the coast of West Greenland. The smaller animals of the species are, at the same time, found further to the south than in the spring, at floes, fields, or even among loose ice, but most plentifully about fields or floes, at the border of the main western ice, in the latitude of 78° or 78½°. In July, the fishery generally terminates, sometimes at the beginning of the month, at others, though more rarely, it continues throughout the greater part of it. Few small fish are seen at this season.

The parallel of 78° to 78½° is, on the whole, the most productive fishing-station. The interval between this parallel and 80°, or any other situation more remote, is called the "northward," and any situation in a lower latitude than 78° is called the "southward." Though the 79th degree affords whales in the greatest abundance, yet the 76th degree affords them, perhaps, more generally. In this latter situation a very large kind of the mysticetus is commonly to be found, throughout the season, from April to July inclusive. Their number, however, is not often great; and as the situation in which they occur is unsheltered, and, consequently, exposed to heavy swells, the southern fishery is not much frequented. The parallel of 77° to 77½° is considered a "dead latitude" by the fishers, but occasionally it affords whales also.

From an attentive observation of facts, it would appear that various tribes of the mysticetus inhabit different regions, and pursue various routes on their removal from the places where first seen. These tribes seem to be distinguished by a difference of age or manners, and, in some instances, apparently by one of species or subspecies. The systematical movements of the whales receive illustration from many well-known facts. Sometimes a large tribe, passing from one place to another, which, under such circumstances, is denominated a "run of fish," has been traced in its movements, in a direct line from the south towards the north, along the seaward edge of the western ice, through a space of two or three degrees of latitude; then it has been ascertained to have entered the ice, and penetrated to the northward beyond the reach of the fishers. In certain years, it is curious to observe, that the whales commence a simultaneous retreat throughout the whole fishing limits, and all disappear within the space of a very few days.

Having now mentioned, generally, the principal places resorted to by the whales in the Spitzbergen seas, it will, possibly, be interesting to such as are in any way concerned in the fishery, to notice more distinctly their favourite haunts under particular circumstances.

Experience proves that the whale has its favourite places of resort, depending on a sufficiency of food, particular circumstances of weather, and particular portions and qualities of the ice. Thus, though many whales may have been seen in open water when the weather was fine, after the occurrence of a storm perhaps not one is to be seen; and, though fields are sometimes the resort of hundreds of whales, yet, whenever the loose ice around separates entirely away, the whales quit them also. Hence, fields seldom afford whales in much abundance, excepting at the time when they first "break out," and become accessible; that is, immediately after a vacancy is made on some side by the separation of adjoining fields, floes, or drift-ice. Whales are rarely seen in abundance in the large open spaces of water which sometimes occur amidst fields and floes, nor are they commonly seen in a very open pack, unless it be in the immediate neighbourhood of the main western ice. They seem to have a preference for close packs and patches of ice, and for fields under certain circumstances; for deep bays, or *bights*, and sometimes for clear water situations; occasionally for detached streams of drift-ice, and most generally for extensive sheets of bay-ice. Bay-ice is a favourite retreat of the whales, so long as it continues sufficiently tender to be conveniently broken for the purpose of respiration. In such situations, whales may frequently be seen in amazing numbers, elevating and breaking the ice with their crowns, the eminences on their heads in which their blow-holes are situated.

The most favourable opportunity for prosecuting the fishery commonly occurs with north, north-west, or west winds. At such times, the sea near the ice is almost always smooth, and the atmosphere, though cloudy and dark, is generally free from fog or thick snow. The fishers prefer a cloudy to a clear sky, because, in very bright weather, the sea becomes illuminated, and the shadows of the whale-boats are so deeply impressed in the water by the beams of the sun, that the whales are very apt to take the alarm, and evade the utmost care and skill of their pursuers. South-east or east winds, though disagreeable, cause a violent agitation of the pieces of ice, and so annoy the whales as to induce them to leave their retreat and appear in the open sea. Although the fishery requires a cloudy atmosphere, yet it must be free from fog or continued snow; smooth water, with a breeze of wind, and navigably open, or perfectly solid ice.

The boats and principal instruments employed in the capture of the whale next claim a description. Whale-boats are, of course, peculiarly adapted for the occupation they are intended to be employed in. A well-constructed Greenland boat possesses the following properties :—It floats lightly and safely on the water, is capable of being rowed with great speed, and readily turned round ; it is of such capacity, that it carries six or seven men, seven or eight hundred weight of whale-line, and various other materials, and yet retains the necessary properties of safety, buoyancy, and speed, either in smooth water, or where it is exposed to a considerable sea. Whale-boats, being very liable to receive damage, both from whales and ice, are always carver-built—a structure which is easily repaired. They are usually of the following dimensions. Those called six-oared boats, adapted for carrying seven men, six of whom, including the harpooner, are rowers, are generally twenty-six to twenty-eight feet in length, and about five feet nine inches in breadth. Six-men boats, that is, with five rowers and a steersman, are usually twenty-five to twenty-six feet in length, and about five feet three inches in breadth; and four-oared boats are usually twenty-three to twenty-four feet in length, and about five feet, three inches in breadth. The main breadth of the two first classes of boats is at about three-sevenths of the length of the boat, reckoned from the stern ; but in the last class it is necessary to have the main breadth within one-third of the length of the boat from the stern.

The object of this is to enable the smaller boat to support, without being dragged under water, as great a strain on the lines as those of a larger class; otherwise, if such a boat were sent out by itself, its lines would be always liable to be lost before any assistance could reach it.

The five-oared or six-men boat is that which is in general use; though each fishing-ship generally carries one or two of the largest class. These boats are now commonly built of fir boards, one-half or three-fourths of an inch thick, with timbers, keel, gunwales, stern, and stern-post of oak. An improvement in the timbering of whale-boats has lately been made, by sawing the timber out of very straight grained oak, and bending them to the required form after being made supple by the application of steam, or immersion in boiling water. This improvement, which renders the timbers more elastic than when they are sawn out of crooked oak, and at the same time makes the boat stronger and lighter, was suggested by Thomas Brodrick, esq., of Whitby, ship-builder. Though the principle has long been acted upon in clincher-built boats, with ash timbers, the application to carver-built whale-boats is, I believe, new. The bow and stern of Greenland boats are both sharp, and in appearance very similar, but the stern forms a more acute angle than the bow. The keel has some depression in the middle from which the facility of turning is acquired.

The instruments of general use in the capture of the whale are the harpoon and the lance. The harpoon is an instrument of iron, of about three feet in length. It consists of three conjoined parts, called the "socket," "shank," and "mouth," the latter of which includes the barbs or "withers." This instrument, if we except a small addition to the barbs and some enlargement of dimensions, maintains the same form in which it was originally used in the fishery two centuries ago. At that time, the mouth or barbed extremity was of a triangular shape, united at the shank in the middle of one of the sides, and this being scooped out on each side of the shank formed two simple flat barbs. In the course of last century, an improvement was made by adding another small barb, resembling the beard of a fishhook, within each of the former withers in a reverse position. The two principal withers in the present improved harpoon measure about eight inches in length and six in breadth, the shank is eighteen inches to two feet in length, and four-tenths of an inch in diameter, and the socket, which is hollow, swells from the size of the shank to near two inches diameter, and is about six inches in length. Now, when the harpoon is forced by a blow into the fat of the whale, and the line is held tight, the principal withers seize the strong ligamentous fibres of the blubber, and prevent it from being withdrawn; and, in the event of its being pulled out so far as to remain entangled by one wither only, which is frequently the case, then the little reversed barb, or "stop-wither," as it is called, collecting a number of the same reticulated sinewy fibres, which are very numerous near the skin, prevents the harpoon from being shaken out by the ordinary motions of the whale. The point and exterior edges of the barbs of the harpoon are sharpened to a rough edge by means of a file. This part of the harpoon is not formed of steel, as it is frequently represented, but of common soft iron, so that when blunted it can be readily sharpened by a file, or even by scraping it with a knife.

The most important part in the construction of this instrument is the shank. As this part is liable to be forcibly and suddenly extended, twisted, and bent, it requires to be made of the softest and most pliable iron. That kind which is of the most approved tenacity is made of old horse-shoe nails or *stubs*, which are formed into small rods, and two or three of these welded together, so that should a flaw happen to occur in any one of the rods, the strength of the whole might still be depended on. Some manufacturers inclose a quantity of stub-iron in a cylinder of best foreign iron, and form the shank of the harpoon out of a single rod. A test, sometimes used for trying the sufficiency of a harpoon, is to wind its shank round a bolt of inch-iron, in the form of a close spiral, then to unwind it again, and put it into a straight form. It it bears this without injury in the cold state, it is considered as excellent. The breaking of a harpoon is of no less importance than the value of a whale, which is sometimes estimated at more than £1000 sterling. This consideration has induced many ingenious persons to turn their attention towards improving the construction and security of this instrument, but though various alterations have been suggested, such as forming the shank of wire, adding one or two lateral barbs, etc., ete., they have all given place to the simplicity of the ancient harpoon.

Next in importance to the harpoon is the lance, which is a spear of iron of the length of six feet. It consists of a hollow socket, six inches long, swelling from half an inch, the size of the shank, to near two inches in diameter, into which is fitted a four feet stock or handle of fir; a shank, five feet long and half an inch in diameter; and a mouth of steel, which is made very thin, and exceedingly sharp, seven or eight inches in length, and two or two and a half in breadth. Besides these instruments, there is also the harpoon gun. It was invented in the year 1731, and used by some individuals with success. Being however difficult, and somewhat dangerous in its application, it was laid aside for many years. In 1771 or 1772, a new one was produced to the Society of Arts, and received as an original invention. Between 1772 and 1792, the Society expended large sums in premiums to whale-fishers and to artisans for improvements in the gun and harpoon. Since 1792, they have generally been in the habit of offering a premium of ten guineas to the harpooner who should shoot the greatest number of whales in one season, not being less than three. This premium, however, though it has been frequently offered, has been seldom claimed. In its present improved form, as made by Mr. Wallis, gunsmith, Hull, the harpoon-gun consists of a kind of swivel, having a barrel of wrought-iron 24 or 26 inches in length, of 3 inches exterior diameter, and $1\frac{7}{8}$ inches bore. It is furnished with two locks, which act simultaneously, for the purpose of diminishing the liability of the gun missing fire. The shank of the harpoon is double, terminating in a cylindrical knob, fitting the bore of the gun. Between the two parts of the shank is a wire ring, to which is attached the line. Now, when the harpoon is introduced into the barrel of the gun, the ring with the attached line remains on the outside near the mouth of the harpoon, but the instant that it is fired, the ring flies back against the cylindrical knob. The harpoon-gun has been rendered capable of throwing a harpoon near forty yards with effect, yet, on account of the difficulty in the management of it, it has not been very generally adopted.

In the course of the outward passage, the different utensils are fitted for immediate use.

One preparation is that which is known by the name of "spanning harpoons." A piece of rope, of the best hemp, called a "fore-ganger," about two and a quarter inches in circumference, and eight or nine yards in length, is spliced closely round the shank of the harpoon, the swelled socket of which prevents the eye of the *splice* from being drawn off. A stock, or handle, six or seven feet in length, is then fitted into the socket, and fastened in its place through the medium of the fore-ganger. The fastening of the stock is sufficient only for retaining it firm in its situation during the discharge of the weapon, but is liable to be disengaged soon afterwards; on which the harpoon, relieved from the shake and twist of this no longer necessary appendage, maintains its hold with better effect. After the stock drops out, it is seldom lost, but still hangs on the line by means of a loop of cord, fixed openly round it, for the purpose of preventing the stock from floating away. Every harpoon is stamped with the name of the ship to which it belongs; and when prepared for use, a private mark, containing the name of the ship and master, with the date of the year written upon leather, is concealed beneath some rope-yarns, wound round the socket of the instrument, and the same is sometimes introduced also into the fore-ganger. These marks serve to identify the harpoons, when any dispute happens to arise relative to the claims of different ships to the same fish and have sometimes proved of essential service in deciding cases which might otherwise have extended to vexatious litigations.

A harpoon thus prepared, with fore-ganger and stock, is said to be "spanned in." In this state, the point or mouth, being very clean and sharp, is preserved in the same condition by a shield of oiled paper or canvas; and the instrument, with its appendages, laid up in a convenient place, ready for being attached to the whale-line in a boat when wanted.

The principal preparations for commencing the fishery are included in the "fitting of the boats." In this work all the people belonging to the ship are employed. The boats are first cleared of all lumber, and then the whale-lines, each consisting of 120 fathoms of rope, about two and a quarter inches in circumference, are spliced to each other, to the amount of about six to each boat, the united length of which is about 720 fathoms, or 4,320 feet; and the whole carefully and beautifully coiled in compartments in the boat prepared for the purpose. A portion of five or six fathoms of the line first put into the boat, called the "stray-line," is left uncovered by that which follows, and coiled by itself in a small compartment at the stern of the boat: it is furnished with a loop or "eye," for the facility of connecting the lines of one boat with those of another. To the upper end of the line is spliced the fore-ganger of a spanned harpoon, thus connecting the harpoon with all the lines in the boat.

Every boat completely fitted is furnished with two harpoons (one spare,) six or eight lances, and five to seven oars, together with the following instruments and apparatus:—A "jack," or flag, fastened to a pole, intended to be displayed as a signal, whenever a whale is harpooned; a "tail-knife," used for perforating the fins or tail of a dead whale; a "mik," or rest, made of wood, for supporting the stock of the harpoon when ready for instant service; an "axe," for cutting the line when necessary; a "pigging," or small bucket, for bailing the boat or wetting the running lines; a "snatch-block;" a "grapnel;" two "boat-hooks;" a "fid;" a wooden "mallet," and "snow-shovel;" also, a small broom and a "swab," together with spare tholes, grommets, etc. In addition to these, the two six-oared or other swiftest boats are likewise furnished with an apparatus, called a "winch," for heaving the lines into the boat after the fish is either killed or has made his escape; and in some ships they also carry a harpoon-gun, and apparatus for loading. The whole of the articles above enumerated are disposed in convenient places throughout the boat. The axe is always placed within the reach of the harpooner, who, in case of an accident, can cut the line in an instant; the harpoon-gun is fixed by its swivel to the boat's stern; the lances are laid in the sides of the boat, upon the thwarts; the hand-harpoon is placed upon the mik, or rest, with its stock, and on the bow of the boat with its point, and the fore-ganger is clearly coiled beneath it, so that the harpoon can be taken up and discharged in a moment. An oar is used for steering, in preference to a rudder, in consequence of its possessing many advantages: an oar does not retard the velocity of the boat so much as a rudder; it is capable of turning the boat when in a state of rest, and more readily than a rudder when in motion; and it can be used for propelling the boat in narrow places of the ice, where the rowers cannot ply their oars, by the process of sculling, and in calms for approaching a whale without noise, by the same operation.

The crew of a whale-ship are separated into divisions, equal in number to the number of the boats. Each division, consisting of a harpooner, a boat-steerer, and a line-manager, together with three or four rowers, constitutes a boat's crew. The harpooner's principal office is, as his name implies, to strike the whale, also to guide the line, or to kill an entangled whale with his lances. When in pursuit he rows the bow-oar. He has the command of the boat. The boat-steerer ranks next to the harpooner; he guides the course of the boat, watches the motions of the whale pursued, intimates its movements to the harpooner, and stimulates the crew to exertion by encouraging exclamations. The line-manager rows the "after-oar" in the boat, and, conjointly with the boat-steerer, attends to the lines when in the act of running out or coiling in. The remainder of the crew pull the oars. Besides these divisions of the seamen of a whaler into boats' crews, they are classed on the passages, and when no whale-fishing is going on, as in other vessels, into watches.

On fishing-stations, when the weather is such as to render the fishery practicable, the boats are always ready for instant service, suspended from davits, or cranes, by the sides of the ship, and furnished with stores, as before enumerated; two boats at least, the crews of which are always in readiness, can in general be manned and lowered into the water within the space of one minute of time. Wherever there is a probability of seeing whales, when the weather and situation are such as to present a possibility of capturing them, the "crow's nest" is generally occupied by the master, or some one of the officers, who, commanding from thence an extensive prospect of the surrounding sea, keeps an anxious watch for the appearance of a whale. Assisted by a telescope, he views the operations of any ship which may be in sight at a distance; and occasionally sweeps the horizon with his glass, to extend the limited sphere of vision in which he is able to discriminate a whale with the naked eye to an area vastly greater. The moment that a fish is seen, he gives notice to the "watch upon deck," part of whom leap into a boat, are lowered down, and push off towards the place. If the fish be large, a second boat is immediately dispatched to the support of the other. When the whale again appears, two boats row towards it with their utmost speed, and though they may be disappointed in all their attempts, they generally continue the pursuit until the fish either takes the alarm and escapes, or they are recalled by a signal to the ship. When two or more fishes appear at the same time in different situations, the number of boats sent in pursuit is commonly increased. When the whole of the boats are sent out, the ship is said to have "a loose fall." During fine weather, when there is great probability of finding whales, a boat is generally kept in readiness, manned and afloat, sometimes towed by a rope astern, or, if the ship be still, at a little distance. There are several rules observed in approaching a whale, as precautions, to prevent the animal from taking the alarm. As the whale is dull of hearing, but quick of sight, the boat-steerer always endeavours to get behind it, and, in accomplishing this, he sometimes takes a circuitous route. In calm weather, when guns are not used, the greatest caution is necessary before a whale can be reached; smooth careful rowing is always requisite, and sometimes sculling.

When it is known that a whale seldom abides longer on the surface of the water than two minutes, that it generally remains from five to ten or fifteen minutes under water, that in this interval it sometimes moves through the space of half a mile or more, and that the fisher has very rarely any certain intimation of the place in which it will reappear—the difficulty and address requisite to approach sufficiently near, during its short stay on the surface, to harpoon it, will be readily appreciated. It is, therefore, a primary consideration with the harpooner always to place his boat as near as possible to the spot where he expects the fish to rise; and he considers himself successful in the attempt when the fish "comes up within a start," that is, within the distance of about two hundred yards. A whale moving forward, at a small distance beneath the surface of the sea, leaves a sure indication of its situation in what is called "an eddy," having somewhat the resemblance of "the wake," or track of a ship; and in fine calm weather, its change of position is sometimes pointed out by the birds, many of which closely follow it when at the surface, and hover over it when below, whose keener vision can discern it when it is totally concealed from human eye. By these indications many whales have been taken.

The providence of God is manifested in the tameness and timidity of many of the largest inhabitants of the earth and sea, whereby they fall victims to the prowess of man, and are rendered subservient to his convenience in life. And this was the design of the lower animals in their creation, for God, when he made man, gave him "dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth." The holy psalmist, when considering the power and goodness of God in the creation, exclaimed, "What is man, that thou art mindful of him; and the son of man, that thou visitest him?" And, in contemplation of the glory and honour put upon man by the Almighty, in the power given him over created nature, he adds, "Thou madest him to have dominion over the works of thy hands; thou hast put all things under his feet: . . . . the fowl of the air, and the fish of the sea, and whatsoever passeth through the paths of the seas. O Lord our Lord, how excellent is thy name in all the earth!" Hence, while we admire the cool and determined intrepidity of those who successfully encounter the huge mysticetus, if we are led to reflect on the source of the power by which the strength of men is rendered effectual for the mighty undertaking, our reflections must lead us to the great First Cause as the only source from whence such power could be derived. If there be peril in the encounter between man and God's most powerful creatures, how much more dangerous must be the struggle between man and the Lord his Maker; and how certain, if it be prolonged, the terrible issue of such a contest! The power of the mighty monster of the deep, or even of the most glorious archangel, is as nothing in comparison with Him to whom power belongeth, and who will overwhelm his adversaries with a fearful and final perdition. Now, however, there is no fury in him, and he is as condescending as he is powerful, entreating his rebellious subjects to receive the peace of his reconciliation, and to draw near to him with a penitent and contrite heart, through the merit and intercession of his Son, in whom he assures us of a free and complete forgiveness.

Whenever a whale lies on the surface of the water, unconscious of the approach of its enemies, the hardy fisher rows directly upon it; and, an instant before the boat touches it, buries his harpoon in its back; but if, while the boat is at a little distance, the whale should indicate its intention of diving, by lifting its head above its common level, and then plunging it under water, and raising its body till it appears like a large segment of a sphere, the harpoon is thrown from the hand, or fired from a gun, the former of which methods, when skilfully practised, is efficient at the distance of eight or ten yards, and the latter at the distance of thirty yards, or upward. The wounded whale, in the surprise and agony of the moment, makes a convulsive effort to escape. Then is the moment of danger The boat is subjected to the most violent blows from its head or its fins, but particularly from its ponderous tail, which sometimes sweeps the air with such tremendous fury, that both boat and men are exposed to one common destruction.

The head of the whale is avoided, because it cannot be penetrated with the harpoon ; but any part of the body between the head and the tail will admit of the full length of the instrument, without danger of obstruction. The moment that the wounded whale disappears, or leaves the boat, a jack or flag, elevated on a staff, is displayed, on sight of which those on watch in the ship give the alarm, by stamping on the deck, accompanied by a simultaneous and continuous shout of " a fall." This word, derived from the Dutch language, is expressive of the conduct of the sailors in jumping, dropping, falling to man the boats on an occasion requiring extreme dispatch, At this sound, the sleeping crew arouse, jump from their beds, rush upon deck, with their clothes tied by a string in their hands, and crowd into the boats. With a temperature of zero, should a "fall" occur, the crew would appear on deck, shielded only by their drawers, stockings, and shirts, or other habiliments in which they sleep. They generally contrive to dress themselves in part, at least, as the boats are lowered down, but sometimes they push off in the state in which they rise from their beds, row away towards the " fast-boat," and have no opportunity of clothing themselves for a length of time afterwards. The alarm of " a fall " has a singular effect on the feelings of a sleeping person unaccustomed to the whale-fishing business. It has often been mistaken as a cry of distress. A landsman in a Hull ship, seeing the crew on an occasion of a fall rush upon deck, with their clothes in their hands, and leap into the boats, when there was no appearance of danger, thought the men were all mad; but with another individual the effect was totally different. Alarmed with the extraordinary noise, and still more so when he reached the deck with the appearance of all the crew seated in the boats in their shirts, he imagined the ship was sinking. He therefore endeavoured to get into a boat himself; but every one of them being fully manned, he was always repulsed. After several fruitless endeavours to gain a place among his comrades, he cried out, with feelings of evident distress, "What shall I do?—will none of you take me in?"

The first effort of a "fast-fish," or whale that has been struck, is to escape from the boat by sinking under water. After this, it pursues its course directly downward, or reappears at a little distance, and swims with great celerity near the surface of the water towards any neighbouring ice among which it may obtain an imaginary shelter; or it returns instantly to the surface, and gives evidence of its agony by the most convulsive throes, in which its fins and tail are alternately displayed in the air and dashed into the water with tremendous violence. The former behaviour, however, that is, to dive towards the bottom of the sea, is so frequent in comparison of any other, that it may be considered as the general conduct of a "fast-fish." A whale, struck near the edge of any large sheet of ice, and passing underneath it, will sometimes run the whole of the line out of one boat in the space of eight or ten minutes of time. To retard, therefore, as much as possible, the flight of the whale, and to secure the lines, it is usual for the harpooner to cast one, two, or more turns of the line round a kind of post, called a *bollard*, which is fixed within ten or twelve inches of the stern of the boat for the purpose. Such is the friction of the line, when running round the bollard, that it frequently envelopes the harpooner in smoke; and if the wood were not repeatedly wetted, would probably set fire to the boat.

During the capture of one whale, a groove is sometimes cut in the bollard, near an inch in depth, and were it not for a plate of brass, iron, or a block of lignum vitæ, which covers the top of the stern, where the line passes over, it is apprehended that the action of the line on the material of the boat would cut it down to the water's edge in the course of one season of successful fishing. The approaching distress of a boat for want of line is indicated by the elevation of an oar in the way of a mast, to which is added a second, a third, or even a fourth, in proportion to the nature of the exigence. The utmost care and attention are requisite on the part of every person in the boat when the lines are running out, fatal consequences having been sometimes produced by the most trifling neglect. On my first voyage to the whale-fishery, such an accident occurred. A thousand fathoms of line were already out, and the fast-boat was forcibly pressed against the side of a piece of ice. The harpooner, in his anxiety to retard the flight of the whale, applied too many turns of the line round the bollard, which, getting entangled, drew the boat beneath the ice. Another boat providentially was at hand, into which the crew, including myself, who happened to be present, had just time to escape. The whale, with near two miles length of line, was, in consequence of the accident, lost.

When fish have been struck by myself, I have, on different occasions, estimated their rate of descent. For the first 300 fathoms, the average velocity was usually after the rate of eight to ten miles per hour. In one instance, the third line of 120 fathoms was run out in sixty-one seconds, that is, at the rate of 816 miles, or 718 nautical miles, per hour. The average stay under water of a wounded whale, which steadily descends after being struck, according to the most usual conduct of the animal, is about thirty minutes. The longest stay I ever observed was fifty-six minutes; but in shallow water I have been informed it has sometimes been known to remain an hour and a half at the bottom after being struck, and yet has returned to the surface alive. The greater the velocity, the more considerable the distance to which it descends, and the longer the time it remains under water, so much greater in proportion is the extent of exhaustion, and the consequent facility of accomplishing its capture. Immediately that it reappears, the assisting boats make for the place with their utmost speed, and as they reach it, each harpooner plunges his harpoon into its back, to the amount of three, four, or more, according to the size of the whale and the nature of the situation. Most frequently, however, it descends for a few minutes after receiving the second harpoon, and obliges the other boats to await its return to the surface before any attack can be made. It is afterwards actively plied with lances, which are thrust into its body, aiming at its vitals. At length, when exhausted by numerous wounds and the loss of blood, which flows from the huge animal in copious streams, it indicates the approach of its dissolution by discharging from its "blow-holes" a mixture of blood along with the air and mucus which it usually expires, and finally jets of blood. The sea to a great extent around is dyed with its blood, and the ice-boats and men are sometimes drenched with the same. Its track is likewise marked by a broad pellicle of oil, which exudes from his wounds, and appears on the surface of the sea. Its final capture is sometimes preceded by a convulsive and energetic struggle, in which its tail, reared, whirled, and violently jerked in the air, resounds to the distance of miles. In dying, it turns on its back, or on its side, which joyful circumstance is announced by the capturers with the striking of their flags, accompanied with three lively huzzas.

The remarkable exhaustion observed on the first appearance of a wounded whale at the surface, after a descent of 700 or 800 fathoms perpendicular, does not depend on the nature of the wound it has received, for a hundred superficial wounds received from harpoons could not have the effect of a single lance penetrating the vitals, but is the effect of the almost incredible pressure to which the animal must have been exposed. The surface of the body of a large whale may be considered as comprising an area of 1,540 square feet. This, under the common weight of the atmosphere alone, must sustain a pressure of 3,104,640 lbs, or 1,386 tons. But at the depth of 800 fathoms, where there is a column of water equal in weight to about 154 atmospheres, the pressure on the animal must be equal to 211,200 tons. This is a degree of pressure of which we can have but an imperfect conception. It may assist our comprehension, however, to be informed, that it exceeds in weight sixty of the largest ships of the British navy, when manned, provisioned, and fitted for a six months' cruise.

By the motions of the fast-boat, the movements of the whale are estimated. Every fast-boat carries a flag, and the ship to which such boats belong also wears a flag, until the whale is either killed or makes its escape. These signals serve to indicate to surrounding ships the exclusive title of the fast-ship to the entangled whale, and to prevent their interference, excepting in the way of assistance in the capture.

With respect to the length of time requisite for capturing a whale, it may be remarked that this greatly depends on the activity of the harpooners, the favourableness of situation and weather, and on the peculiar conduct of the whale attacked. I have myself witnessed the capture of a large whale in twenty-eight minutes, and have also been engaged with another fish, which was lost, after it had been entangled about sixteen hours. Under the most favourable circumstances, the average length of time occupied in the capture of a whale may be stated as not exceeding an hour, and the general average, including all sizes of fish and all circumstances of capture, may probably be two or three hours. The mode described in the preceding pages of conducting the fishery for whales under favourable circumstances, may be considered as the general plan pursued by the fishers of all ports of Britain, as well as of those of other nations who resort to Spitzbergen.

The ease with which some whales are subdued, and the slightness of the entanglement by which they are taken, are truly surprising; but, with others, it is equally astonishing, that neither line nor harpoon, nor any number of each, is sufficiently strong to effect their capture. Whales have even been taken in consequence of the entanglement of a line, without any harpoon at all; though, when such a case has occurred, it has evidently been the result of accident. A harpooner belonging to the Prince of Brazils, of Hull, had struck a small fish. It descended, and remained for some time quiet, and at length appeared to be drowned. The strain on the line being then considerable, it was taken to the ship's capstern, with a view of heaving the fish up. The force requisite for performing this operation was extremely various; sometimes the line came in with ease, at others, a quantity was withdrawn with great force and rapidity. As such, it appeared evident that the fish was yet alive. The heaving, however, was persisted in, and after the greater part of the lines had been drawn on board, a dead fish appeared at the surface, secured by several turns of the line round its body. It was disentangled with difficulty, and was confidently believed to be the whale that had been struck. But when the line was cleared from the fish, it proved to be merely the "bight," for the end still hung perpendicularly downward. What was then the surprise to find that it was still pulled away with considerable force! The capstern was again resorted to, and shortly afterwards they hove up, also dead, the fish originally struck, with the harpoon still fast. Hence, it appeared that the fish first drawn up had got accidentally entangled with the line, and, in its struggles to escape, had still further involved itself, by winding the line repeatedly round its body. The fish first entangled, as was suspected, had long been dead, but it was this interloper that occasioned the jerks and other singular effects observed on the line.

The method already described is that which is adopted for the capture of whales under the most favourable circumstances, and is subject to many alterations when the situation or circumstances are peculiar. Hence arise various modes of capturing the whale, which furnish abundant opportunities for the exercise of ingenuity and skill, and are attended by their peculiar dangers. To an enumeration of these various methods, according to local circumstances, we now proceed to direct the reader's attention.

1. *Pack-fishing.*—The borders of close packs of drift-ice are frequently a favourite resort of large whales. To attack them in such a situation subjects the fisher to great risks in his lines and boats, as well as uncertainty in effecting their capture. When a considerable swell prevails on the borders of the ice, the whales, on being struck, will sometimes recede from the pack, and become the prize of their assailers;

but most generally they flee to it for shelter, and frequently make their escape. To guard against the loss of lines as much as possible, it is usual either to strike two harpoons from different boats at the same moment, or to bridle the lines of a second boat upon those of the boat from which the fish is struck. This operation consists in fixing other lines to those of the fast-boat, at some distance from the harpoon, so that there is only one harpoon and one line immediately attached to the fish, but the double strength of a line from the place of their junction to the boats. Hence, should the fish flee directly into the ice, and proceed to an inaccessible distance, the two boats bearing an equal strain on each of their lines can at pleasure draw the harpoon, or break the single part of the line immediately connected with it, and in either case secure themselves against any considerable loss.

When a pack, from its closeness, prevents boats from penetrating, the men travel over the ice, leaping from piece to piece, in pursuit of the entangled whale. In this pursuit they carry lances with them, and sometimes harpoons, with which, whenever they can approach the fish, they attack it; and if they succeed in killing it, they drag it towards the exterior margin of the ice, by means of the line fastened to the harpoon with which it was originally struck. In such cases, it is generally an object of importance to sink it beneath the ice; for effecting which purpose, each lobe of the tail is divided from the body, excepting a small portion of the edge, from which it hangs pendulous in the water. If it still floats, bags of sand, kedges, or small cannon, are suspended by a block on the bight of the line, wherewith the buoyancy of the dead whale is usually overcome. It then sinks, and is easily hauled out by the line into the open sea.

To particularize all the variety of pack-fishing, arising from wind and weather, size of the fish, state and peculiarities of the ice, etc., would require more space than the interest of the subject to general readers would justify. I shall therefore only remark, that pack-fishing is, on the whole, the most troublesome and dangerous of all others; that instances have occurred of fish having been entangled during forty or fifty hours, and escaped after all; and that other instances are remembered, of ships having lost the greater part of their stock of lines, several of their boats, and sometimes, though happily less commonly, some individuals of their crews.

2. *Field-fishing.*—The fishery for whales, when conducted at the margin of those wonderful sheets of solid ice, called fields, is, when the weather is fine, and the refuge for ships secure, the most agreeable, and sometimes the most productive of all situations which the fishery of Greenland presents. A fish struck at the margin of a large field of ice generally

descends obliquely beneath it, takes four or eight lines from the fast-boat, and then returns exhausted to the edge. It is then attacked in the usual way with harpoons and lances, and is easily killed. There is one evident advantage in field-fishing, which is this: when the fast-boat lies at the edge of a firm unbroken field, and the line proceeds in an angle beneath the ice, the fish must necessarily arise somewhere in a semicircle described from the fast-boat as a centre, with a sweep not exceeding the length of the lines out; but most generally it appears in a line extending along the margin of the ice, so that the boats, when dispersed along the edge of the field, are as effectual and as ready for promoting the capture as twice the number of boats or more when fishing in open situations; because, in open situations, the whale may arise anywhere within a circle, instead of a semicircle, described by the length of the lines withdrawn from the fast-boat, whence it frequently happens that all the attendant boats are disposed in a wrong direction, and the fish recovers its breath, breaks loose, and escapes before any of them can secure it with a second harpoon. Hence, when a ship fishes at a field with an ordinary crew and six or seven boats, two of the largest fish may be struck at the same time with every prospect of success; while the same force attempting the capture of two at once in an open situation, will not unfrequently occasion the loss of both. There have, indeed, been many instances of a ship's crew, with seven boats, striking at a field six fish at the same time, and succeeding in killing the whole ; generally speaking, six boats at a field are capable of performing the same execution as near twice that number in open situations. Besides, fields sometimes afford an opportunity of fishing, when in any other situation there can be little or no probability of success, or, indeed, when to fish elsewhere is utterly impracticable. Thus, calms, storms, and fogs, are great annoyances in the fishery in general, and frequently prevent it altogether, but at fields the fishery goes on under any of these disadvantages. As there are several important advantages attending the fishery at fields, so likewise there are some serious disadvantages, chiefly relating to the safety of the ships engaged in the occupation. The motions of fields are rapid, various, and unaccountable, and the power with which they approach each other, and squeeze every resisting object, immense ; hence occasionally vast mischief is produced, which it is not always in the power of the most skilful and attentive master to foresee or prevent.

Such are the principal advantages and disadvantages of fields of ice to the whale-fishery The advantages, however, as above enumerated, though they extend to large floes, do not extend to small floes, or to such fields, how large soever they may be, as contain cracks or holes, or are filled up with thin ice in the interior. Large and firm fields are the most convenient, and likewise the most advantageous for the fishery; the most convenient, because the whales, unable to breathe beneath a close extensive field of ice, are obliged to make their appearance again above water among the boats on the look out; and they are the most advantageous, because not only the most fish commonly resort to them, but a greater number can be killed with less force, and in a shorter space of time, than in any other situation. Thin fields, or fields full of holes, being by no means advantageous to fish by, are usually avoided, because a "fast fish" retreating under such a field, can respire through the holes in the centre as conveniently as on the exterior; and a large fish usually proceeds from one hole to another, and if determined to advance, cannot possibly be stopped. In this case, all that can be done is, to break the line or draw the harpoon out. But when the fish can be observed blowing in any of the holes in a field, the men travel over the ice, and attack it with lances, pricking it over the nose to endeavour to turn it back. This scheme, however, does not always answer the expectations of the fishers, as frequently the fear of his enemies acts so powerfully on the whale that he pushes forward towards the interior to his dying moment. When killed, the same means are used as in pack-fishing to sink it, but they do not always succeed; for the harpoon is frequently drawn out, or the line broken in the effort. If, therefore, no attempt to sink the fish avails, there is scarcely any other practicable method of making a prize of it, (unless when the ice happens to be so thin that it can be broken with a boat, or a channel readily cut in it with an ice-saw,) than cutting the blubber away, and dragging it piece by piece across the ice to the vessel, which requires immense labour, and is attended with vast loss of time. Hence we have a sufficient reason for avoiding such situations, whenever fish can be found elsewhere.

As connected with this subject, I cannot pass over a circumstance which occurred within my own observation, and which excited my highest admiration. On the 8th July, 1813, the ship Esk lay by the edge of a thin sheet of ice, in which were several thin parts and some holes. Here a fish being heard blowing, a harpoon, having a line connected with it, was conveyed across the ice by a boat on guard, and the harpooner succeeded in striking the whale, at the distance of 350 yards from the verge. It dragged out ten lines, (2,400 yards,) and was supposed to be seen blowing in different holes in the ice. After some time, it happened to make its appearance on the exterior, when a harpoon was struck at the moment it was on the point of proceeding again beneath. About a hundred yards from the edge, it broke the ice where it was a foot in thickness with its crown, and respired through the opening. It then determinately pushed forward, breaking the ice as it advanced, in spite of the lances continually directed against it. It reached at length a kind of basin in the field, where it floated on the surface of the water without any encumbrance from ice. Its back being fairly exposed, the harpoon struck from the boat was observed to be so slightly entangled that it was ready to drop out. Some of the officers lamented this circumstance, and expressed a wish that the harpoon were better fast, observing at the same time that if it should slip out, the fish would either be lost, or they would be under the necessity of flensing it where it lay, and of dragging the pieces of blubber over the ice to the ship, a kind and degree of labour every one was anxious to avoid. No sooner was the wish expressed, and its importance made known, than one of the sailors, a smart and enterprising fellow, stepped forward and volunteered his services to strike it better in. Not at all intimidated by the surprise which was manifested in every countenance by such a bold proposal, he pulled out his pocket-knife, leapt upon the back of the living whale, and immediately cut the harpoon out. Stimulated by this courageous example, two of his companions proceeded to his assistance. While one of them hauled upon the line, and held it in his hands, the other set his shoulder against the extremity of the harpoon, and, though it was without a stock, he contrived to strike it again into the fish more effectually than it was at first. The fish was in motion before this was finished. After they got off its back, it advanced a considerable distance, breaking the ice all the way, and survived this uncommon treatment ten or fifteen minutes. This admirable act was an essential benefit. The fish sunk spontaneously after being killed, on which it was hauled out to the edge of the ice by the line, and secured without further trouble. It proved a stout whale, and a very acceptable prize.

When a ship approaches a considerable field of ice, and finds whales, it is usual to moor to the leeward side of it, from which the adjoining ice generally first separates. Boats are then placed on watch on each side of the ship, and stationed at intervals of one hundred or one hundred and fifty yards along the edge of the ice. Hence, if a fish arises anywhere between the extreme boats, it seldom escapes unhurt. It is not uncommon for a great number of ships to moor to the same sheet of ice. When the whale-fishery of the Hollanders was in a flourishing state, above one hundred sail of ships might sometimes be seen moored to the same field of ice, each having two or more boats on watch. The field would in consequence, be so nearly surrounded with boats, that it was almost impossible for a fish to rise near the verge of the ice without being within the limits of a start of some of them.

3. *Fishing in crowded ice or in open packs.*—In navigable open drift-ice, or amongst small detached streams and patches, either of which serve in a degree to break the force of the sea, and to prevent any considerable swell from arising, we have a situation which is considered as one of the best possible for conducting the fishery in; consequently, it comes under the same denomination as those favourable situations in which I have first attempted to describe the proceedings of the fishers in killing the whale. But the situation I now mean to refer to is when the ice is crowded and nearly close, so close, indeed, that it scarcely affords room for boats to pass through it, and by no means sufficient space for a ship to be navigated among it. This kind of situation occurs in somewhat open packs, or in large patches of crowded ice, and affords a fair probability of capturing a whale, though it is seldom accomplished without a considerable deal of trouble. When the ice is very crowded, and the ship cannot sail into it with propriety, it is usual, especially with foreigners, to seek out for a mooring to some mass of ice, if such can be found, extending two or three fathoms or more under water. A piece of ice of this kind is capable not only of holding the ship "head to wind," but also to windward of the smaller ice. The boats then set out in chase of any fish which may be seen, and when one happens to be struck, they proceed in the capture in a similar manner as

when under more favourable circumstances, excepting so far as the obstruction which the quality and arrangement of the ice may offer to the regular system of proceeding. Among crowded ice, for instance, the precise direction pursued by the fish is not easily ascertained, nor can the fish itself be readily discovered on its first arrival at the surface after being struck, on account of the elevation of the intervening masses of ice, and the great quantity of line it frequently takes from the fast-boat. Success in such a situation depends on the boats being spread widely abroad, and on a judicious arrangement of each boat; on a keen look out on the part of the harpooners in the boats, and on their occasionally taking the benefit of a hummock of ice, from the elevation of which the fish may sometimes be seen blowing in the interstices of the ice; on pushing or rowing the boats with the greatest imaginable celerity towards the place where the fish may have been seen; and lastly, on the exercise of the highest degree of activity and dispatch in every proceeding.

If these be neglected, the fish will generally have taken breath, recovered its strength, and removed to some other quarter, before the arrival of the boats; and it is often remarked, that if there be one part of the ice more crowded or more difficult of access than another, it commonly retreats thither for refuge. In such cases, the sailors find much difficulty in getting to it with their boats, having to separate many pieces of ice before they can pass through between them. But when it is not practicable to move the pieces, and when they cannot travel over them, they must either drag the boats across the intermediate ice, or perform an extensive circuit before they can reach the opposite side of the close ice, into which the whale has retreated.

A second harpoon in this case, as indeed in all others, is a material point. They proceed to lance whenever the second harpoon is struck, and strike more harpoons as the auxiliary boats progressively arrive at the place. When the fish is killed, it is often at a distance from the ship, and so circumstanced that the ship cannot get near it. In such cases, the fish must be towed by the boats to the ship ; an operation which, among crowded ice, is most troublesome and laborious.

4. *Bay-ice fishing.*—Bay-ice constitutes a situation which, though not particularly dangerous, is yet, on the whole, one of the most troublesome in which whales are killed. In sheets of bay-ice, the whales find a very effectual shelter ; for so long as the ice will not carry a man, they cannot be approached with a boat without producing such a noise as must certainly warn them of the intended assault ; and if a whale, by some favourable accident, were struck, the difficulties of completing the capture are always numerous, and sometimes

prove insurmountable. The whale having free locomotion beneath the ice, the fishers pursue it under great disadvantage. The fishers cannot push their boats toward it but with extreme difficulty, while the whale, invariably warned by the noise of their approach, possesses every facility for avoiding its enemies.

In the year 1813, I adopted a new plan of fishing in bay-ice, which was attended with the most successful result. The ship under my command, the Esk, of Whitby, was frozen into a sheet of bay-ice, included in a triangular space, formed by several massive fields and floes. Here a number of small whales were seen sporting around us in every little hole or space in the bay-ice, and occasionally they were observed to break through it for the purpose of breathing. In various little openings free of ice near the ship, few of which were twenty yards in diameter, we placed boats, each equipped with a harpoon and lines, and directed by two or three men. They had orders to place themselves in such a situation that if a fish appeared in the same opening they could scarcely fail of striking it. Previous to this, I supplied myself with a pair of ice-shoes, consisting of two pieces of thin deal, six feet in length, and seven inches in breadth. They were made very thin at both ends, and in the centre of each was a hollow place, exactly adapted for the reception of the sole of my boot, with a loop of leather for confining the toes. I was thus enabled to retain the ice-shoes pretty firmly to my feet when required, or, when I wished it, to disengage them in a moment. Where the ice was smooth, it was easy to move in a straight line, but in turning I found a considerable difficulty, and required some practice before I could effect it without falling. I advanced with tolerable speed, where the ice was level on the surface, by sliding the shoes alternately forward, but when I met with rough hilly places I experienced great inconvenience. When, however, the rough places happened to consist of strong ice, which generally was the case, I stept out of my ice-shoes until I reached a weaker part. Equipped with this apparatus, I travelled safely over ice which had not been frozen above twenty-four hours, and which was incapable of supporting the weight of the smallest boy in the ship.

Whenever a fish was struck, I gave orders to the harpooner, in running the line, to use every means of drowning it; the trouble of hauling it up, under the circumstances in which the ship was placed, being a matter of no consideration. This was attempted by holding a steady tight strain on the line, without slacking it or jerking it unnecessarily, and by forbearing to haul the line when the fish stopped. By this measure, one fish, the stoutest of the three which we got, was drowned. When others were struck, and the attempt to drown them failed, I provided myself with a harpoon, and observing the direction of the line, travelled towards the place where I expected the fish to rise. A small boat was launched, more leisurely, in the same direction for my support; and whenever the ice in my track was capable of supporting a man, assistance was afforded me in dragging the line. When the wounded fish appeared, I struck my harpoon through the ice, and then, with some occasional assistance, proceeded to lance it, until it was killed. At different times, the fish rose beneath my feet, and broke the ice on which I stood; on one occasion, where the ice was happily more than usually strong, I was obliged to leave my ice shoes, and skip off. In this way we captured three fish, and took their produce on board, while several ships near us made not the least progress in the fishery. After they were killed, we had much trouble in getting them to the ship, but as we could not employ ourselves to advantage in any other way, we were well satisfied with the issue. This part of the business I could not effect alone, and all hands, who were occasionally employed in it, broke through the ice. Some individuals broke in two or three times, but no serious accident ensued. As a precaution, we extended a rope from man to man, which was held in the hands of each in their progress across the ice, and which served for drawing those out of the water who happened to break through. Sometimes ten or a dozen of them would break in at once, but so far was such an occurrence from exciting distress, that each of their companions indulged a laugh at their expense, notwithstanding they probably shared the same fate a minute or two afterwards.

5. *Fishing in storms.*—Excepting in situations sheltered from the ice, it would be alike useless and presumptuous to attempt to kill whales during a storm. Instances, however, occur, wherein fish that were struck during fine weather, or in winds which do not prevent the boats from plying about, remain entangled, but unsubdued, after the commencement of a storm. Sometimes the capture is completed, at others the fishers are under the necessity of cutting the lines, and allowing the whale to escape. Sometimes, when they have succeeded in killing it, and in securing it during the gale with a hawser to the ship, they are enabled to make a prize of it on the return of moderate weather; at others, after having it to appearance secured by means of a sufficient rope, the dangerous proximity of an ice-pack constrains them to cut it adrift and abandon it for the preservation of their vessel. After thus being abandoned, it becomes the prize of the first who gets possession of it, though it be in the face of the original capturers. A storm commencing while the boats are engaged with an entangled fish, sometimes occasions serious disasters. Generally, however, though they suffer the loss of the fish, and perhaps some of their boats and materials, yet the men escape with their lives.

6. *Fishing in foggy weather.*—The fishery in storms can never be voluntary; but in foggy weather, though occasionally attended with hazard, the fishery is not altogether impracticable. The fogs which occur in the icy regions in June and July are generally dense and lasting: they are so thick, that objects cannot be distinguished at the distance of 100 or 150 yards, and frequently continue for several days without attenuation. To fish with safety and success, during a thick fog, is, therefore, a matter of difficulty, and of still greater uncertainty. When it happens that a fish conducts itself favourably, that is, descends almost perpendicularly, and, on its return to the surface, remains nearly stationary, or moves round in a small circle, the capture is usually accomplished without hazard or particular difficulty; but when, on the contrary, it proceeds with any considerable velocity in a horizontal direction, or obliquely downwards, it soon drags the boats out of sight of the ship, and shortly so confounds the fishers in the intensity of the mist, that they lose all traces of the situation of their vessel. If the fish, in its flight, draws them beyond the reach of the sound of a bell, or a horn, their personal safety becomes endangered; and if they are removed beyond the sound of cannon, their situation becomes extremely hazardous, especially if no other ships happen to be in the immediate vicinity. Meanwhile, whatever may be their

imaginary or real danger, the mind of their commander must be kept in the most anxious suspense until they are found; and whether they may be in safety or near perishing with fatigue, hunger, and cold, so long as he is uncertain of their fate, his anxiety must be the same.

Before entering on the subsequent operations of the whalers, connected with a successful fishery, I shall give a few examples of remarkable strength, activity, or other peculiarity, in the behaviour of whales after they have been struck, being a few of the curious circumstances connected with the fishery which I have myself observed, or have received from unquestionable authority. On the 25th June, 1812, one of the harpooners belonging to the Resolution, of Whitby, under my command, struck a whale by the edge of a small floe of ice; assistance being promptly afforded, a second boat's lines were attached to those of the fast-boat in a few minutes after the harpoon was discharged; the remainder of the boats proceeded to some distance in the direction which the fish seemed to have taken. In about a quarter of an hour, the fast-boat, to my surprise, again made a signal for lines. As the ship was then within five minutes' sail, we instantly steered towards the boat, with the view of affording assistance by means of a spare boat we still retained on board. Before we reached the place, however, we observed four oars displayed in signal order, which, by their number, indicated a most urgent necessity for assistance. Two or three men were at the same time seen seated close by the stern, which was considerably elevated, for the purpose of keeping it down, while the bow of the boat, by the force of the line, was drawn down to the level of the sea, and the harpooner, by the friction of the line round the bollard, was enveloped in smoky obscurity. At length, when the ship was scarcely one hundred yards distant, we perceived preparations for quitting the boat. The sailors' pea jackets were cast upon the adjoining ice; the oars were thrown down; the crew leaped overboard; the bow of the boat was buried in the water; the stern rose perpendicularly, and then majestically disappeared. The harpooner having caused the end of the line to be fastened to the iron ring at the boat's stern was the means of its loss; and a *tongue* of the ice, on which was a depth of several feet of water, kept the boat, by the pressure of the line against it, at such a considerable distance as prevented the crew from leaping upon the floe. Some of them were, therefore, put to the necessity of swimming for their preservation, but all of them succeeded in scrambling upon the ice, and were taken on board the ship in a few minutes. It may be here observed, that it is an uncommon circumstance for a fish to require more than two boats' lines in such a situation; none of our harpooners, therefore, had any scruple in leaving the fast-boat, never suspecting, after it had received the assistance of one boat with six lines, or upward, that it would need any more.

Several ships being about us, there was a possibility that some person might attack and make a prize of the whale, when it had so far escaped us that we no longer retained any hold of it; as such, we set all sail the ship could safely sustain, and worked through several narrow and intricate channels in the ice in the direction I observed the fish had retreated. After a little time, it was descried by the people in the boats at a considerable distance to the eastward; a general chase immediately commenced, and within the space of an hour three harpoons were struck. We now imagined that the fish was secure, but our expectations were premature. The whale resolutely pushed beneath a large floe that had been recently broken to pieces by the swell, and soon drew all the lines out of the second fast-boat, the officer of which, not being able to get any assistance, tied the end of his line to a hummock of ice and broke it. Soon afterwards, the other two boats, still *fast*, were dragged against the broken floe, when one of the harpoons drew out. The lines of only one boat, therefore remained fast to the fish, and this, with six or eight lines out, was dragged forward into the shattered floe with astonishing force; pieces of ice, each of which were sufficiently large to have answered the purpose of a mooring for the ship, were wheeled about by the strength of the whale; and such was the tension and elasticity of the line that, whenever it slipped clear of any mass of ice, after turning it round into the space between any two adjoining pieces, the boat and its crew flew forward through the crack with the velocity of an arrow, and never failed to launch several feet upon the first mass of ice that it encountered.

While we scoured the sea around the broken floe of the ship, and while the ice was attempted in vain by the boats, the whale continued to press forward in an easterly direction towards the sea. At length, when fourteen lines, about 1,680 fathoms, were drawn from the fourth fast-boat, a slight entanglement of the line broke it at the stern. The fish again made its escape, taking along with it a boat and twenty-eight lines. The united length of the lines was 6,720 yards, or upwards of three English miles and three-quarters; value with the boat above £150 sterling. The obstruction of the sunken boat to the progress of the fish must have been immense, and that of the lines likewise considerable, the weight of the lines alone being thirty-five hundred weight. So long as the fourth fast-boat, through the medium of its lines, retained its hold of the fish, we searched the adjoining sea with the ship in vain, but in a short time after the line was divided we got sight of the object of pursuit at the distance of near two miles to the eastward of the ice and boats, in the open sea. One boat only with lines, and two empty boats, were reserved by the ship. Having, however, happily fine weather and a breeze of wind, we immediately gave chase under all sails, though it must be confessed with the insignificant force by us, the distance of the fish, and the rapidity of its flight considered, we had but very small hopes of success. At length, after pursuing it five or six miles, being at least nine miles from the place where it was struck, we came up with it, and it seemed inclined to rest after its extraordinary exertion. The two dismantled or empty boats having been furnished with two lines each, (a very inadequate supply,) they, together with the one in good state of equipment, now made an attack upon the whale. One of the harpooners made a blunder; the fish saw the boat, took the alarm, and again fled. I now supposed it would be seen no more; nevertheless, we chased nearly a mile in the direction I imagined it had taken, and placed the boats to the best of my judgment in the most advantageous situations. In this instance we were extremely successful. The fish rose near one of the boats, and was immediately harpooned. In a few minutes, two more harpoons entered its back, and lances were plied against it with vigour and success. Exhausted by its amazing exertions to escape, it yielded itself at length to its fate, received the piercing wounds of the lances without resistance, and finally died without a struggle. After all, it may seem surprising that it was not a particularly large individual, the largest lamina of whalebone only measuring nine feet six inches, while those affording twelve feet bone are not uncommon. The quantity of line withdrawn from the different boats engaged in the capture was singularly great. It amounted altogether to 10,440 yards, or nearly six English miles. Of these, thirteen new lines were lost, together with the sunken boat, the harpoon connecting them with the fish having dropped out before the whale was killed. Thus terminated with success an attack upon a whale, which exhibited the most uncommon determination to escape from its pursuers, seconded by the most amazing strength, of any individual whose capture I ever witnessed.

When engaged in the pursuit of a large whale, it is a necessary precaution for two boats at all times to proceed in company, that the one may be able to assist the other on any emergency. With this principle in view, two boats from the Esk were sent out in chase of some large whales, on the 13th of June, 1814. No ice was within sight, the boats had proceeded some time together, when they separated in pursuit of two whales, not far distant from each other, when, by a singular coincidence, the harpooners each struck his fish at the same moment. They were a mile from the ship. Urgent signals for assistance were immediately displayed by each boat, and, in a few minutes, one of the harpooners was under the necessity of slipping the end of his line. Happily, the other fish did not descend so deep, and the lines in the boat proved adequate to the occasion. One of the fish being then supposed to be lost, five of the boats, out of seven, attended on the fish which yet remained entangled, and speedily killed it. A short time afterwards, the other fish supposed to be irrecoverably lost, was descried at a little distance from the place where it was struck ; three boats proceeded against it ; it was immediately struck, and in twenty minutes also killed. Thus were successfully captured two whales, both of which had been despaired of. They produced us near forty tuns of oil, value at that time £1,400. The lines attached to the fish last killed were recovered in a remarkable manner. The harpooners were busily engaged in attempting to secure them, when the harpoon, by which alone they were prevented from sinking, slipped out ; but as it descended in the water, it luckily hooked the line belonging to another boat, by which both harpoon and lines were preserved.

It is very generally believed by the whalers, that fish have occasionally been struck, which, by sudden extension or heave of the body, have instantly disengaged themselves from the harpoon. This usually happens when the whale is struck " with a slack back," as that position of the fish is denominated, in which the back being depressed the flesh is relaxed. A harpoon then struck occasions an uncommon wound. Hence, if the fish suddenly extends itself and elevates its back, the wound appears of twice the size of the harpoon, and consequently the weapon is capable of being thrown out by the jerk of the body. Under such circumstances as these, a large whale was struck by a harpooner belonging to the ship Howe, of Shields. The fish extending and lifting its back with uncommon violence, the harpoon was disengaged and projected high into the air, when, at the same moment, the fish rolled over upon its back, and received the point of the falling weapon in its belly, whereby it was captured and caught. This circumstance, romantic as it may appear, is so well authenticated by the person who struck the fish, together with others who were in the boat at the same time, and were witnesses of the fact, that I have no scruple in introducing it here.

On the 28th of May, 1817, the Royal Bounty, of Leith, captain Drysdale, fell in with a great number of whales, in the lat. 77° 25′ north, and long. 5° or 6° east. Neither ice nor land was in sight, nor was there supposed to be either the one or the other within fifty or sixty miles. A brisk breeze of wind prevailed, and the weather was clear. The boats were, therefore, manned and sent in pursuit. After a chase of about five hours, the harpooner, commanding a boat, who, with another in company, had rowed out of sight of the ship, struck one of the whales. This was about four A.M., of the 29th. The captain, supposing from the long absence of the two most distant boats that a fish had been struck, directed the course of the ship towards the place where he had last seen them, and about eight A.M. he got sight of a boat which displayed the signal for being *fast*. Some time afterwards, he observed the other boat approach the fish, a second harpoon struck, and the usual signal displayed. As, however, the fish dragged the two boats away with considerable speed, it was midday before any assistance could reach them. Two more harpoons were then struck, but such was the vigour of the whale that, although it constantly dragged through the water four to six boats, together with a length of 1,600 fathoms of line which it had drawn out of the different boats, yet it pursued its flight nearly as fast as a boat could row and such was the terror that it manifested on the approach of its enemies, that, whenever a boat passed beyond its tail, it invariably dived. All their endeavours to lance it were, therefore, in vain.

The crews of the loose boats being unable to keep pace with the fish, caught hold of and moored themselves to the fast-boats; and for some hours afterwards, all hands were constrained to sit in idle impatience, waiting for some relaxation in the speed of the whale. Its most general course had hitherto been to windward, but a favourable change taking place, enabled the ship, which had previously been at a great distance, to join the boats at eight P.M. They succeeded in tacking one of the lines to the ship which was fast to the fish, with a view of retarding its flight. They then furled the top-gallant sails, and lowered the top sails; but after supporting the ship a few minutes head to wind, the wither of the harpoon upset or twisted aside, and the instrument was disengaged from its grasp. The whale immediately set off to windward with increased speed, and it required an interval of three hours before the ship could again approach it. Another line was then taken on board, which immediately broke. A fifth harpoon had previously been struck, to replace the one which had been pulled out, but the line attached to it was soon afterwards cut. They then instituted various schemes for arresting the speed of the fish, which occupied their close attention nearly two hours. But its velocity was yet such that the master, who had himself proceeded to the attack, was unable to approach sufficiently near to strike a harpoon. After a long chase, however, he succeeded in getting hold of one of the lines which the fish dragged after it, and in fastening another line to it. The fish then happily turned towards the ship, which was a considerable distance to leeward.

At four P.M. of the 30th, thirty-six hours after the fish had been struck, the ship again joined the boats, when, by a successful manœuvre, they secured two of the fast lines on board. The wind blowing a moderately brisk breeze, the top-gallant sails were taken in, the courses hauled up, and the top sails clewed down, but, notwithstanding the resistance a ship thus situated must necessarily offer, she was towed by the fish directly to windward with the velocity of at least one-half to two knots during an hour and a half; and then, though the whale must have been greatly exhausted, it beat the water with its fins and tail in so tremendous a way, that the sea around was in a continual foam, and the most hardy of the sailors scarcely dared to approach it. At length, about eight P.M., after forty hours of almost incessant, and for the most part fruitless exertion, this formidable and astonishing animal was killed. The capture and the flensing occupied forty-eight hours. The fish was eleven feet four inches in bone, (the length of the longest lamina of whalebone,) and its produce filled forty-seven butts, or twenty-three and a half tun casks, with blubber.

I proceed now to enumerate the proceedings of the fishers after a whale is killed. Some preliminary measures are requisite before a whale can be flensed. The first operation performed on a dead whale is to lash it with a rope, passed several times through two holes pierced through the tail to the bow of the boat. The more difficult operation of freeing the whale from the entanglement of the line is then attempted. As the whale, when dead, always lies on its back or on its side, the lines and harpoons are generally far under water. When they are seen passing obliquely downwards, they are hooked with a grapnel, pulled to the surface, and cut. But, when they hang perpendicular, or when they cannot be seen, they are discovered by a process called "sweeping a fish." This is performed by taking a part of a whale-line in two different boats, ten or fifteen fathoms asunder, and while one boat lies at rest, supporting the end of a line, the other is rowed round the fish, and the bight or intermediate part of the line allowed to sink below the fish as it proceeds, until each of the parts held in the two boats are again brought together. Hence, when one part of the line has made a circuit of the fish, it must evidently inclose every other line or appendage affixed to it. Thus inclosed, they are pulled up to the surface of the water, and each of them cut at the splice of the fore-ganger, leaving the harpoon sticking in the fish, with its fore-ganger attached, and allowing the end of the line to sink, and be hauled on board of the boat from whence it was withdrawn at the convenience of the crew. While this is in progress, the men of other boats, having first lashed the tail to a boat, are employed in lashing the fins together across the belly of the whale.

On one occasion I was myself engaged in the capture of a fish, upon which, when to appearance dead, I leaped, cut holes in the fins, and was in the act of "reeving" a rope through them to lash them together, when the fish sank beneath my feet. As soon as I observed that the water had risen above my knees, I made a spring towards a boat, at the distance of three or four yards from me, and caught hold of the gunwale. Scarcely was I helped on board, before the fish began to move forward, turn from its back upon its belly, reared its tail aloft, and began to shake it with such prodigious violence, as to resound through the air to the distance of two or three miles. In the meanwhile all the sailors very properly kept aloof, and beheld its extraordinary power with the greatest astonishment. After two or three minutes of this violent exercise, it ceased, rolled upon its side, and died.

A fish being properly secured, is then "taken in tow;" that is, all the boats form themselves in a line, by ropes always carried for the purpose, and unite their efforts in rowing towards the ship. Towing a fish is usually considered a cheerful though laborious operation, and is generally performed with great expressions of joy. A large whale, by means of six boats, can be towed at a rate of nearly a mile per hour. The fish having reached the ship, is taken to the larboard side, arranged and secured for flensing. For the performance of this operation, a variety of knives and other instruments are requisite. Towards the stern of the ship the head of the fish is directed, and the tail, which is first cut off, rests abreast of the fore-chains; the smallest or posterior part of the whale's body, where the tail is united, is called the rump, and the extremity or anterior part of the head, the nose or nose-end. The rump, then, supported by a tackle, is drawn forward by means of a stout rope, called the rump-rope; and the head is drawn in an opposite direction, by means of the "nose-tackle." Hence the body of the fish is forcibly extended. The right-side fin, being next the ship, is lashed upwards towards the gunwale. A band of blubber, two or three feet in width, encircling the fish's body, and lying between the fins and the head, being the fat of the neck, or what corresponds in other animals with the neck, is called the kent, because by means of it the fish is turned over, or kented. Now, to the commencement of this imaginary band of fat, or kent, is fixed the lower extremity of a combination of powerful blocks, called the kent-purchase. Its upper extremity is fixed round the head of the main-mast, and its fall or rope is applied to the windlass, drawn tight, and the upper surface of the fish raised several inches above the water. The enormous weight of a whale prevents the possibility of raising it more than one-fourth or one-fifth part out of the water, except indeed when it has been some days dead, in which case it swells, in consequence of air generated by putrefaction, until one-third of its bulk appears above the surface. The fish then lying belly upward, extended, and well secured, is ready for commencing the operation of flensing. In this state a suspension of labour is generally allowed, in which the crew refresh themselves and prepare for the ensuing duties.

An unhappy circumstance once occurred in an interval of this kind. At that period of the fishery, (forty or fifty years ago,) when a single stout whale was sufficient to remunerate the owners of a ship for the expenses of the voyage, great joy was exhibited on the capture of a whale by the fishers. They not only had a dram of spirits, but were sometimes provided with some favourite "mess," on which to regale themselves before they commenced the arduous task of flensing. At such a period, the crew of an English vessel had captured their first whale. It was taken to the ship, placed on the lee-side, and though the wind blew a strong breeze, it was fastened only by a small rope attached to the fin. In this state of supposed security, all hands retired to regale themselves, the captain himself not excepted. The ship being at a distance from any ice, and the fish believed to be secure, they made no great haste in their enjoyment. At length, the specksioneer, having spent sufficient time in indulgence and equipment, with an air of importance and self-confidence, proceeded on deck, and naturally turned to look on the whale. To his astonishment it was not there. In some alarm, he looked astern, ahead, on the other side, but his search was useless; the ship drifting fast had pressed forcibly upon the whale, the rope broke, the fish sank, and was lost. The mortification of this event may be conceived, but the termination of their vexation will not easily be imagined, when it is known that no other opportunity of procuring a whale occurred during the voyage. The ship returned home clean. The blessings of Divine Providence, of a temporal and also of a spiritual kind, are bestowed and continued in union with the activity and watchfulness of those who receive them, and it is a law of the earthly, and also of the heavenly treasure, that "whosoever hath, to him shall be given; and whosoever hath not, from him shall be taken even that which he seemeth to have."

After the whale is properly secured, and the men are sufficiently refreshed, the harpooners, having their feet armed with "spurs," to provent them from slipping, descend upon the fish. Two boats, each of which is under the guidance of one or two boys, attend upon them, and serve to hold all their knives and other apparatus. Thus provided, the harpooners, directed by the specksioneer, divide the fat into oblong pieces, or "slips," by means of "blubber-spades" and "blubber-knives;" then affixing a "speck-tackle" to each slip, progressively flay it off as it is drawn upward. The speck-tackles, which are two or three in number, are rendered effective by capsterns, winches, or other mechanical powers. Each of them consists of a simple combination of two single blocks, one of which is securely fixed in a strong rope, extended between the main-top and the fore-top, called a guy, and the other is attached by a strap to the blubber of the whale. The flensers commence with the belly and under-jaw, being the only part then above water. The blubber, in pieces of half a ton to a ton each, is received upon deck by the boat-steerers and line-managers, the former with "strand-knives" divide it into portable, cubical, or oblong pieces, containing near a solid foot of fat, while the latter, furnished with "pick-haaks," pass it between decks, down a hole in the main-hatches. It is then received by two men styled kings, who pack it in a receptacle provided for it in the hold, or other suitable place, called the flense-gut, where it remains until further convenience.

All the fat being taken away from the belly, and the right fin removed, the fish is then turned on its side, by means of the kent, which, by the power of the windlass, readily performs this office. The upper surface of fat is again removed, together with the left fin, and after a second kenting one of the "lips" is taken away, by which the whale-bone of one side of the head, now lying nearly horizontal, is exposed. The fish being a little further turned, the whalebone of the left side is dislodged by the use of the "bone hand-spikes," "bone-knives," and "bone-spades." Four instruments, which, when combined, constitute what is called the bone-geer, are used, with the assistance of two speck-tackles, for taking up the whalebone in one mass. On its arrival on deck, it is split with "bone-wedges" and "junks," containing from five to ten blades each, and stowed away. A further kenting brings the fish's back upward, and the next exposes the second side of bone. As the fish is turned or kented round, every part of the blubber becomes progressively uppermost and is removed. At length, when the whole of the blubber, whalebone, and jawbones have been taken on board, the kent, which now appears a slip of perhaps thirty feet in length, is also separated, together with the rump-rope and nose-tackle, on which the carcase being at liberty, generally sinks in the water and disappears. When it floats, however, it becomes food for bears, sharks, and various kinds of birds, all of which attack it with the most voracious earnestness. It is known by the name of the kreng.

When sharks are present, they generally take the liberty of helping themselves very bountifully during the progress of the flensing, but they often pay for their temerity with their lives. Fulmars pay close attendance in immense numbers. They seize the fragments occasionally disengaged by the knife while they are swimming in the water, but most of the other gulls who attend on the occasion take their share on the wing. The burgomaster is decidedly the master of the feast. Hence, every other bird is obliged to relinquish the most delicious morsel when the burgomaster descends to claim it. Bears seldom approach so near the ship as to become partakers of the banquet. When dispatch is seconded by ability, the operation of flensing can be accomplished on a fish affording from twenty to thirty tons of blubber in the space of three or four hours, and, probably, the average time with British fishers but little exceeds four hours.

Some years ago, I was witness of a circumstance in which a harpooner was exposed to the most imminent risk of his life, at the conclusion of a flensing process, by a very curious accident. This harpooner stood on one of the jaw-bones of a fish with a boat by his side. In this situation, while he was in the act of cutting the kreng adrift, a boy inadvertently struck the point of the boat-hook, with which he usually held the boat, through the ring of the harpooner's spur, and in the same act seized the jawbone of the fish with the hook of the same instrument. Before this was discovered, the kreng was set at liberty, and began instantly to sink. The harpooner then threw himself towards the boat, but being firmly entangled by the foot, he fell into the water. Providentially he caught the gunwale of the boat with his hands, but, overpowered by the force of the sinking kreng, he was on the point of relinquishing his grasp when some of his companions got hold of his hands, while others threw a rope round his body. The carcase of the fish was suspended entirely by the poor fellow's body, which was, consequently, so dreadfully extended that there was some danger of his being drawn asunder. But such was his terror of being taken under water, and not, indeed, without cause, for he could never have risen again, that, notwithstanding the excruciating pain he suffered, he constantly cried out to his companions to "haul away the rope." He remained in that dreadful state until means were adopted for hooking the kreng with the grapnel, and bringing it back to the surface of the water. Had he not caught hold of the boat as he was sinking and met with such prompt assistance, he must infallibly have perished.

Next to the process of flensing is that of making-off. When the flens-gut is filled with blubber, or when, no fish being seen, a favourable opportunity of leisure is presented, the operation of making-off is generally commenced. This consists of freeing the fat from all extraneous substances, especially the muscular parts and the skin, then cutting it into small pieces, and putting it into cask through the bung-holes. In the first instance, the ship must be moored to a convenient piece of ice, or placed in an open situation, and the sails so reduced as to require no further attention in the event of bad weather occurring. The hold of the ship must be cleared of its superstructure of casks, until the "ground tier," or lowest stratum of casks is exposed, and the ballast-water must be "started," or pumped out of all the casks that are removed upon deck, as well as out of those on the ground tier, which are first prepared for the reception of the blubber. In "breaking out the hold," it is not necessary to lay open more of the ground tier at a time than three or four casks extend in length.

While the line-managers, together with the "skee-man," (the officer who has the direction of operations in the hold,) the cooper, and perhaps a few others, are employed in breaking out the hold, the rest of the crew on the deck arrange all the variety of apparatus used for the preparation of the blubber before it is put into the casks. Of this apparatus, the most considerable part is the "speck-trough," with its appendages. It consists of a kind of oblong box or chest, about twelve feet in length, one and three quarters feet in breadth, and one and a half feet in depth. The speck-trough is fixed upon the deck, as nearly as possible over the place where the casks are to be filled in the hold. A square hole made in its bottom is placed either over the nearest hatchway to the scene of operations, or upon a corresponding hole cut in the deck. The speck-trough is then secured, and its lid turned backwards into an horizontal position. The surface of the lid, forming a level table, is then covered with blocks of whale's-tail from end to end. This substance makes an excellent chopping-block, and preserves the chopping-knives from injury when used for dividing the blubber upon it. Into the square hole in the bottom of the speck-trough is fitted an iron frame, to which is suspended a canvas tube, or "hose," denominated a "lull." The lull is open at both ends. Its diameter is about a foot, and its length suffi cient to reach from the deck to the bottom of the hold. To the middle, or towards the upper part of the lull, is attached a "pair of nippers," consisting of two sticks fastened together by a kind of hinge at one end, and capable of being pressed together at the other. The nippers being passed across the body of the lull, and their detached extremities brought together, they embrace it so closely that nothing can pass downward while they remain in this position; but when, on the other hand, the nippers are extended, the lull forms a free channel of communication between the speck-trough and the hold.

Everything being in readiness, the blubber, as it is now thrown out of the flens-gut by the kings, undergoes the following several operations. It is received upon deck by the "krengers," whose office is to remove all the muscular parts, together with such spongy or fibrous fat as is known by experience to produce very little oil. When these substances, which go under the general denomination of kreng, are included among the blubber in the casks, they pass through a kind of fermentation, and generate such a quantity of gas as sometimes to burst the containing vessels, and occasion the loss of their contents. From the krengers the blubber passes to the harpooners. Each of these officers, provided with a blubber-knife, or a strand-knife, places himself by the side of the "closh," fixed in the deck. An attendant, by means of a pair of "hand-hooks," or a "pick-haak," then mounts a piece of blubber upon the spikes of the closh, and the harpooner slices off the skin. From the skinners, the blubber passes into an open space, called the bank, prepared as a depository in front of the speck-trough, and it is then laid upon the chopping-blocks as wanted. It now falls under the hands of the boat-steerers, who, armed with chopping-knives, are arranged in a line by the side of the chopping-blocks with the speck-trough before them. Thus prepared, they divide the blubber, as it is placed on their blocks, into oblong pieces, not exceeding four inches in diameter, and push it into the speck-trough intended for its reception. And finally, the blubber falls under the direction of the line-managers, stationed in the hold, who receive it into tubs through the hull, and pass it with their hands into the casks, through their bung-holes. When a cask is nearly filled, the packing is completed by the use of a "pricker," one piece after another being thrust in by this instrument until it can contain no more. It is then securely bunged up.

When the ground-tier casks, as far as they have been exposed are filled, the second-tier of casks is stowed upon it, and likewise filled with blubber, together with the third-tier casks when necessary. When fish can be had in sufficiency, the hold is filled and likewise the space between decks. When a ship is deficient in casks, vacancies adapted for the reception of the cargo are filled with blubber in bulk. The operation of making off was in the early ages of the fishery performed on shore, and even so late as the middle of the last century, it was customary for ships to proceed into a harbour, and remain while this process was going on.

In the Greenland whale-fishery, the importance of a code of laws was at a very early period apparent. A fish struck by the people of two different ships became an object of dispute, the first striker claiming the whole, and the second demanding a share for his assistance. Stores saved from wrecked vessels, and especially the cargoes of wrecks, being objects of much moment, were also liable to occasion disputes in a still higher degree. Hence, about the year 1677, the Dutch issued a code of regulations, founded on equitable principles, for the prevention of quarrels and litigation among the fishers. As these were found to be insufficient, the

States-General of Holland and West Friesland, in the year 1696, approved and confirmed the general regulations with respect to the saving of the crews and stores of vessels wrecked in the ice, the right to whales under peculiar circumstances, and other matters connected with the fishery. They consisted of twelve articles, and every captain, specksioneer, and officer concerned in the fishery, was obliged to subscribe them. After being duly announced, these articles were enforced by commissioners, chosen from among the principal Greenland owners of Holland, for conducting and carrying into effect this and other matters connected with the prosperity and regulation of the fishery.

Among the British whale-fishers, it does not appear that any particular laws were ever expressly laid down for the adjusting of differences; yet custom has established certain principles as constituting the rule of right, the legality of which is sufficiently acknowledged by their being universally respected. The fundamental articles are two. First, that a fast fish, or a fish in any way in possession, whether alive or dead, is the sole and unquestionable property of the persons so maintaining the connection or possession; and secondly, that a loose fish, alive or dead, is fair game. The first of these regulations can need no modification, but the second can only be recommended for its simplicity and tendency to prevent litigation, since circumstances may, and do, sometimes occur, in which its application is liable to some objection. In this, as in other departments of human conduct, it is impossible by any strict regulations to prevent all kinds of injustice. The highest code of human morals enjoins on men what they shall be, as well as what they shall do, and provides for them the one golden precept, "Whatsoever ye would that men should do to you, do ye even so to them." Conduct, which it is impossible to punish by appeal to any human tribunal, is often most fearfully in violation of this law, and must await the decisions of that day, when God shall try every man's work of what sort it is.

The following circumstance, which occurred a good many years ago, has a tendency to illustrate the existing Greenland laws, and to set them in a prominent light. During a storm of wind and snow, several ships were beating to windward, under easy sail, along the edge of a pack. When the storm abated and the weather cleared, the ships steered towards the ice. Two of the fleet approached it about a mile asunder, abreast of each other, when the crews of each ship accidentally got sight of a dead fish at a little distance, within some loose ice. Each ship now made sail to endeavour to reach the fish before the other, which fish, being loose, would be the prize of the first that should get possession of it. Neither ship could outsail the other, but each continued to press forward toward the prize. The little advantage one of them had in distance, the other compensated with velocity. On each bow of the two ships was stationed a principal officer, armed with a harpoon, in readiness to discharge. But it so happened that the ships came in contact with each other, when within a few yards of the fish, and in consequence of the shock with which their bows met, they rebounded to a considerable distance. The officers at the same moment discharged their harpoons, but all of them fell short of the fish. A hardy fellow, who was second-mate of the leeward ship, immediately leaped overboard, and with great dexterity swam to the whale, seized it by the fin, and proclaimed it his prize. It was, however, so swollen, that he was unable to climb upon it, but was obliged to remain shivering in the water until assistance should be sent. His captain, elated with his good luck, forgot, or at least neglected, his brave second-mate, and before he thought of sending a boat to release him from his disagreeable situation, prepared to moor his ship to an adjoining piece of ice. Meanwhile, the other ship tacked, and the master himself stepped into a boat, pushed off, and rowed deliberately towards the dead fish. Observing the trembling seaman still in the water, holding by the fin, he addressed him with, "Well, my lad, you've got a fine fish here," to which, after a natural reply in the affirmative, he added, "But don't you find it very cold?" "Yes," replied the shivering sailor, "I'm almost starved; I wish you would allow me to come into your boat until ours arrive." This favour needed no second solicitation; the boat approached the man, and he was assisted into it. The fish being again loose and out of possession, the captain instantly struck his harpoon into it, hoisted his flag, and claimed his prize. Mortified and displeased as the other master felt at this trick, for so it certainly was, he had nevertheless no redress, but was obliged to permit the fish to be taken on board of his competitor's ship, and to content himself with abusing the mate for his want of discretion, and with condemning himself for not having more compassion on the poor fellow's feelings, which would have prevented the disagreeable misadventure.

Success in the whale-fishery has been very generally supposed to depend, not upon the exercise of talent and industry on the part of the masters and crews of the fishing-ships, but solely upon the freaks of fortune. That the fishery, however, is altogether a chain of casualties, is as false as it is derogatory to the credit of the persons employed in the enterprise. The most skilful, from adventitious and unavoidable circumstances, may occasionally fail, and the unskilful may be successful; but if we mark the average of a number of years, that is, where the means are equal, a tolerable estimate may be formed of the adventurer's ability, and his fitness for the undertaking in which he is engaged.

The great variety of success, which is observed to result from the exertions of the different Greenland commanders, when the average of several voyages is taken, confirmed the above position, and the circumstance of some masters, in whatever ship they may sail, almost always succeeding, whilst others, however favourably circumstanced, seldom or ever procure a whole cargo, warrants this conclusion, that, most generally, successful fishery depends on the experience, determined perseverance, and personal talent of the master of the vessel, supported by a necessary degree of skill among the people composing his crew. There are occasions, however, especially in those seasons when the Greenland Seas are open, or in some measure free from ice, in which personal talent becomes of comparative little avail. This was strikingly the case in the year 1817, and in some degree in 1818. In the former season, the ice lay at a distance so remote from Spitzbergen, that a space of about two thousand square miles of the surface of the sea, which is usually covered with ice, was wholly void of it. Whatever decisions the judicious fisher was led by experience to form and act upon proved fallacious, and tended only to embarrass him in all his proceedings. The only indication which could be of the least service to the fisher to assist him in the choice of a situation, was the colour of the sea. In places where the water was transparent, and blue, or greenish blue, it was in vain to look for whales, but in a certain stream of cloudy water, of a deep olive-green colour, all the whales which were seen throughout the season, or at least nine-tenths of them, occurred, and the chief part of those which were caught were found in the same stream of water. This kind of sea-water is the favourite resort of whales during the fishing season, evidently because it abounds with various descriptions of *actiniæ*, *sepiæ*, *medusæ*, and *cancri*, which constitute the chief, if not the sole nourishment of the whale.

Success in the fishery is more certain in close than in open seasons, and has some dependence on the suitable equipment of the ships employed in the trade, on a sufficient apparatus, and frequently in no inconsiderable degree on that valuable property of the ship called fast-sailing. When any opening occurs in the ice of a tempting appearance, it frequently happens that a number of ships enter it together. The fastest sailers lead the way, and often procure a whale or two or more before the heavy sailing ships can perform a navigation, and by the time the latter accomplish it, the run of fish is frequently over. Not a little depends in the fishery on the confidence the sailors have in the skill of their captain, and the efficiency of the personal talents and exertions of their officers. If the officers are generally unsuccessful, they are apt to lose confidence in them, and proceed, even when good opportunities occur, without spirit to the attack. The greater their spirits and confidence are, the greater is the probability of their success. Hence, the crew of a ship which has met with success can generally fish better, and more advantageously under the same circumstances, than the people of a clean ship. For the regulation of the ship's movements, for the choice of a situation, for direction in difficulties, for a stimulus when discouraged, for encouragement when weary, and for a variety of other important matters, the master alone must be looked to, on whom, indeed, almost every considerable effort of judgment or forethought devolves.

I now subjoin a few instances of the dangers which accompany the whale-fishery, most of which presented themselves within the sphere of my own observation. Those employed in the occupation of killing whales are, when actually engaged, exposed to danger from three sources, namely, from the ice, from the climate, and from the whales themselves. Of these, the casualties on the ice are the most uncommon, and the least fatal; those from the climate the most fatal, but not the most frequent; and the whale itself is the source of a great proportion of the accidents which occur.

The following instance illustrates the danger from overhanging masses of ice falling on the boats. The crew of one of the Hull whalers, having killed a fish by the side of an iceberg in Davis's Strait, the fins were lashed together, and the tail secured to a boat in the usual way, but by the efforts only of one boat's crew, all the other boats belonging to the same ship being engaged in the capture of two more whales, neither of which were yet subdued. This circumstance occasioned some altercation among the crew of the boat, as to the propriety of their remaining by the dead whale, or of quitting it, and proceeding in an empty boat which was at hand to the assistance of their companions. The latter measure was carried, but as it was deemed expedient that one man should remain in the boat, to which none of them would consent, they were under the necessity of either remaining in idleness by the fish, or leaving the fish and the boat by themselves. But every one being anxious to participate in the more active exercises of the fishery, they at length agreed unanimously to quit the boat connected with the dead fish, and to proceed to the aid of their comrades. The arrangements were just accomplished in time, for they had not rowed many fathoms from the place before a tremendous crash of the berg ensued, an immense mass of ice fell upon the boat they had just quitted, and neither it nor the fish was ever seen afterwards.

Another danger arises from ice when boats are inclosed and beset, and their crews prevented from joining their ships. On June 17th, 1813, several Greenland fishing-ships penetrated the ice into an enticing opening, in which a number of whales were sporting in fancied security. The John, of Greenock, Neptune, of Aberdeen, Earl Percy, of Kirkcaldy, were immediately, to appearance, successful. The crew of the John in a short time killed several fish; the people of the Neptune killed one, and struck a second; and the crew of the Earl Percy struck one also. Things were in this state when I arrived in the same situation with the Esk. My harpooners, happily as it proved, did not succeed in any measure. The sea was as smooth as the surface of a pond, but the ice I observed was in a strange state of disturbance. Some floes, and some large pieces, moved with a velocity of three to four miles per hour, while other similar masses were at rest. The John, which, on her first arrival in this situation, had navigated an open lake some leagues in circumference, was in the space of a few hours closely beset. The captain of the Neptune, alarmed by the danger to which his men and boats were exposed, left his ship to the care of his second-mate, with eleven or twelve men, and proceeded himself in a boat, making the fifth, to their assistance. In a few minutes, these five boats, together with two belonging to the Earl Percy, were closely fixed in the ice. The ships were forced to a distance; the ice in the course of the following morning spread to the width of seven or eight miles, and shortly afterwards the people in the boats and those in the corresponding ships lost sight of each other.

My father, who at this time commanded the John, had anticipated the consequences of the ice closing, and found refuge in a cove in an adjoining field filled with bay-ice, into which he thrust his ship, and obtained shelter for himself and his comrades who were thus beset. After three days, the ice slackened, and the Neptune boats, together with those belonging to the Earl Percy, left the John, although neither the sea nor their ships were visible. In this adventure they proved successful. When they had rowed many hours to the south-eastward, they discovered a ship, on their approach to which they were invited on board, and received some refreshment. After this, having received information of the relative situation of their ships, they put off, and soon after had the happiness of regaining their respective vessels. This circumstance, which was the occasion of so much anxiety, danger, and loss of time to the crews of the Neptune and Earl Percy, proved the contrary to the people of the John, as they added to her cargo seventeen whales, within the space of five days, and on the sixth, the ice having again slackened, they made their escape into a place of safety.

The climate of the Polar regions becomes a source of danger to the whale-fishers when boats are separated from the ship to which they belong, in foggy weather when they are overtaken by a storm and prevented from joining their ship, and when the people in the boats are long exposed to inclement winds.

On the commencement of a heavy gale of wind, May 11th, 1813, fourteen men put off in a boat from the Volunteer, of Whitby, with the view of setting an anchor in a large piece of ice, to which it was their intention to moor the ship. The ship approached; on a signal being made the sails were clewed up, and a rope fixed to the anchor, but the ice shivering with the violence of the strain, when the ship fell astern the anchor flew out, and the ship went adrift. The sails being again set, the ship was reached to the eastward, (wind at north,) the distance of about two miles, but in attempting to wear and return, the ship, instead of performing the evolution, scudded a considerable distance to leeward, and was then reached out to sea, thus leaving fourteen of her crew to a fate most dreadful, the fulfilment of which seemed inevitable. The temperature of the air was 15° or 16° of Fahrenheit, when these poor men were left upon a detached piece of ice, without food, without shelter from the inclement storm, and deprived of every means of refuge, except in a single boat, which, on account of the number of men, and violence of the storm, was incapable of conveying them to their ship. Death stared them in the face whichever way they turned, and a division in opinion ensued.

Some were wishful to remain by the ice, but the ice could afford them no shelter from the piercing wind, and would probably be soon broken to pieces by the increasing swell; others were anxious to attempt to join their ship, while she was yet in sight, but the force of the wind, the violence of the sea, and the smallness of the boat in comparison of the number of men to be conveyed, were objections which would have appeared utterly insurmountable to any persons but men in a state of despair. Judging that by remaining on the ice death was but retarded for a few hours, as the extreme cold must eventually benumb their faculties, and invite a sleep which would overcome the remains of animation, they determined on making the attempt to row to their ship. Poor creatures! what must have been their sensations at this moment, when the spark of hope yet remaining was so feeble that a premature death even to themselves seemed inevitable. They made the daring experiment, when a few minutes' trial convinced them that the attempt was utterly impracticable. They then, with longing eyes, turned their efforts towards recovering the ice they had left, but their utmost exertions were unavailing. Every one now viewed his situation as desperate, and anticipated as certain the fatal event that was to put a period to his life. How great must have been their delight, and how overpowering their sensations, when, at this most critical juncture, a ship appeared in sight! She was advancing directly towards them; their voices were extended, and their flag displayed. But although it was impossible they should be heard, it was not impossible they should be seen. Their flag was descried by the people on board the ship, their courses were so directed as to form the speediest union, and in a few minutes they found themselves on the deck of the Lively, of Whitby, under circumstances of safety. They received from their townsmen the warmest congratulations, and while each individual was forward in contributing his assistance towards the restoration of their benumbed bodies, each of the rescued appeared sensible that their narrow escape from death was highly providential.

The forbearance of God is wonderful. Perhaps these very men a few hours before were impiously invoking their own destruction, or venting imprecations upon their fellow-beings. True it is, the goodness of the Almighty extendeth over all his works, and that while "he delighteth in mercy" he is "slow to anger." It is no exaggeration to affirm, that every guilty soul of man unpardoned and uncleansed through the blood of the Mediator, is exposed to a peril equally portentous with that which threatened these fishermen. God has, however, provided an ark of mercy, floating on the billows of life's tempestuous, dangerous ocean, within which every soul may find perfect and permanent peace. That ark is even now present, and entrance to it may be instantly secured. To delay is to increase the peril, perhaps beyond the possibility of future relief. "Behold, now is the accepted time; behold, now is the day of salvation." Reader, enter into this ark of mercy by faith in the Lord Jesus!

One of the most calamitous events which in modern times has occurred in the fishery, was that which happened to the crew of the Ipswich, captain Gordon, about fifteen years ago. A whale was struck and killed by the Ipswich's people early in the spring of the year, a season in which the weather is most uncertain. A storm commenced, accompanied with snow, before the capture was completed, but nevertheless the fish was taken to the ship, and having shelter from the ice it was flensed. Meanwhile, four boats' crews were employed on a piece of ice, in hauling in the lines of the fast-boats, etc., during the performance of which duties the ship drifted out of sight of them. Every effort was then made by the captain for discovering these unhappy men, who, being above twenty in number, constituted nearly half of his crew. But the weather continuing thick and stormy, and the frost most intense, it is probable that they all perished before the conclusion of the gale; at least none of them were saved, nor can I learn that any of their bodies were ever found.

The remarkable property of oil in smooth-ing the surface of the sea when considerably agitated, and of preventing breakers in the main ocean, was sometimes resorted to by the ancient whale-fishers for their preservation, when overtaken by storms at sea. It was not unusual, I believe, a century ago, for every whale-boat to carry along with it a keg of oil for this very purpose; which oil, being slowly poured overboard in a storm, afforded a sort of defence to the boat as it drifted to leeward. The height of the waves, it is true, is not affected by the action of the oil, but as it intercepts the attraction which dry air possesses for water, it prevents the immediate action of the wind, quells the ruffled surface of the waves, and in a great degree prevents the tendency to breakers, which constitutes the principal danger in a storm.

The most extensive source of danger to the whale-fisher, when actively engaged in his occupation, arises from the object of his pursuit. The fisher is liable to receive contusions from oars forcibly struck by the fish, or from direct blows from its fins or tail; he is liable to accidents from getting entangled by the lines, or from the boat being drawn under water by the fish through the medium of the lines; and he is in danger of being thrown overboard by the heeling or jerking of the boat, or more particularly from the boat being stove, upset, sunk, or projected into the air, by the force of a blow from the whale.

One of the crew of the John, of Greenock, who was in a fast-boat in the fishery of 1818, unfortunately slipped his foot through a coil of line in the act of running out, which drew him forward to the boat's stern, and separated his foot by the ancle. He was conveyed by the first boat to the ship, where the assistance of several surgeons being procured, the lower part of the leg was cut off. After this, the poor fellow, having received the most unremitting attention from captain Jackson, with the best sustenance and accommodation the ship could afford, was restored to health, and his wound nearly healed before the conclusion of the voyage. It is worthy of being remarked, that the captain and crew of the John subscribed upwards of £24 for his relief, which was increased by the owners of the ship and others, on arrival, to about £37. This sum was placed in the "Provident Bank," at Greenock, from whence he was permitted to draw it, after the rate of 7*s*. per week.

A harpooner, belonging to the Henrietta, of Whitby, when engaged in lancing a whale, into which he had previously struck a harpoon, incautiously cast a little line under his feet that he had just hauled into the boat, after it had been drawn out by the fish. A painful stroke of his lance induced the whale to dart suddenly downward, his line began to run out from beneath his feet, and in an instant caught him by a turn round his body. He had but just time to call out, "Clear away the line!"—"Oh dear!" when he was almost cut asunder, dragged overboard, and drowned. The line was cut at the moment, but without avail. The fish descended a considerable depth and died, from whence it was drawn to the surface by the lines connected with it, and secured.

On the 3rd of June, 1811, a boat from the ship Resolution, commanded at the time by myself, put off in pursuit of a whale, and was rowed upon its back. At the moment that it was harpooned, it struck the side of the boat a violent blow with its tail, the shock of which threw the boat-steerer to some distance into the water. A repetition of the blow projected the harpooner and line-manager in a similar way, and completely drenched the part of the crew remaining in the boat with the sprays. One of the men regained the boat, but, as the fish immediately sank and drew the boat away from the place, his two companions in misfortune were soon left far beyond the reach of assistance. The harpooner, though a practised swimmer, felt himself so bruised and enervated by a blow he had received on the chest, that he was totally incapacitated from giving the least support to his fellow-sufferer. The ship being happily near, a boat, which had been lowered on the first alarm, arrived to their succour at the moment when the line-manager, who was unacquainted with the art of swimming, was on the point of sinking to rise no more. Both the line-manager and harpooner were preserved; and the fish, after a few hours' close pursuit, was subdued.

While the same ship navigated an open lake of water in the 81° north lat., during a keen frost and strong north wind, on the 2nd of June, 1806, a whale appeared, and a boat put off in pursuit. On its second visit to the surface of the sea it was harpooned. A convulsive heave of the tail which succeeded the wound struck the boat at the stern, and, by its reaction, projected the boat-steerer overboard. As the line in a moment dragged the boat beyond his reach, the crew threw some of their oars towards him for his support, one of which he happily seized. The ships and boats being at a considerable distance, and the fast-boat being rapidly drawn away from him, the harpooner cut the line, with the view of rescuing him from his dangerous situation. But no sooner was this act performed than, to their extreme mortification, they discovered, in consequence of some oars being thrown towards their floating comrades, and others being broken or unshipped by the blow from the fish, one oar only remained, with which, owing to the force of the wind, they tried in vain to approach him. A considerable period elapsed before any boat from the ship could afford him assistance, though the men strained every nerve for the purpose. At length, when they reached him, he was found with his arms stretched over an oar, almost deprived of sensation. On his arrival at the ship he was in a deplorable condition. His clothes were frozen like mail, and his hair constituted a helmet of ice. He was immediately conveyed into the cabin, his clothes taken off, his limbs and body dried and well rubbed, and a cordial administered to him. A dry shirt and stockings were then put upon him, and he was laid in the captain's bed. After a few hours' sleep, he awoke, and appeared considerably relieved. He complained of a painful sensation of cold. He was therefore removed to his own berth, and one of his messmates ordered to lie on each side of him, whereby the diminished circulation of the blood was accelerated, and the animal heat restored. The shock on his constitution, however, was greater than was anticipated. He recovered in the course of a few days so as to be able to engage in his ordinary pursuits, but many months elapsed before his countenance exhibited its wonted appearance of health.

A remarkable instance of the power which the whale possesses in its tail was exhibited within my own observation, in the year 1807. On the 29th of May, a whale was harpooned by an officer belonging to the Resolution. It descended a considerable depth, and on its reappearance evidenced an uncommon degree of irritation. It made such a display of its fins and tail, that few of the crew were hardy enough to approach it. The captain, (my father,) observing their timidity, called a boat, and himself struck the second harpoon. Another boat immediately followed, and, unhappily, advanced too far. The tail was again reared into the air in a terrific attitude. The impending blow was evident. The harpooner, who was directly underneath, leaped overboard. At the next moment, the threatened stroke was impressed on the centre of the boat, which buried it in the water. Happily no one was injured. The harpooner, who leaped overboard, escaped certain death by the act, the tail having struck the very spot on which he stood. The effects of the blow were astonishing. The keel was broken, the gunwales and every plank, excepting two, were cut through, and it was evident the boat would have been completely divided had not the tail struck directly upon a coil of lines. The boat was rendered useless.

The Dutch ship, Gort-Moolen, commanded by Cornelius Gerard Ouwekaas, with a cargo of seven fish, was anchored in Greenland, in the year 1660. The captain, perceiving a whale ahead of his ship, beckoned his attendants, and threw himself into a boat. He was the first to approach the whale, and succeeded in harpooning it before the arrival of the second boat, which was on the advance. Jacques Vienkes, who had the direction of it, joined his captain immediately afterwards, and prepared to make a second attack on the fish when it should remount to the surface. At the moment of its ascension, the boat of Vienkes happening unhappily to be perpendicularly above it, was so suddenly and forcibly lifted up by a stroke of the head of the whale, that it was dashed to pieces before the harpooner could discharge his weapon. Vienkes flew along with the pieces of the boat, and fell upon the back of the animal. This intrepid seaman, who still retained his weapon in his grasp, harpooned the whale on which he stood, and by means of the harpoon and the line, which he never abandoned, he steadied himself firmly upon the fish, notwithstanding his hazardous situation, and regardless of a considerable wound that he received in his leg, in his fall along with the fragments of the boat. All the efforts of the other boats to approach the whale and deliver the harpooner were futile. The captain, not seeing any other method of saving his companion, who was in some way entangled with the line, called to him to cut it with his knife, and betake himself to swimming. Vienkes, embarrassed and disconcerted as he was, tried in vain to follow this counsel. His knife was in the pocket of his drawers, and, being unable to support himself with one hand, he could not get it out. The whale meanwhile continued advancing along the surface of the water with great rapidity, but happily never attempted to dive. While his comrades despaired of his life, the harpoon by which he held at length disengaged itself from the body of the whale. Vienkes, being then liberated, did not fail to take advantage of this circumstance. He cast himself into the sea, and, by swimming, endeavoured to regain the boats which continued the pursuit of the whale. When his shipmates perceived him struggling with the waves, they redoubled their exertions. They reached him just as his strength was exhausted, and had the happiness of rescuing this adventurous harpooner from his perilous situation.

In one of my earliest voyages to the whale-fishery, I observed a circumstance which excited my highest astonishment. One of our harpooners had struck a whale; it dived, and all the assisting boats had collected round the fast-boat before it rose to the surface. The first boat which approached it advanced incautiously upon it. It rose with unexpected violence beneath the boat, and projected it and all its crew to the height of some yards in the air. It fell on its side, upset, and cast all the men into the water. One man received a severe blow in his fall, and appeared to be dangerously injured; but, soon after his arrival on board of the ship, he recovered from the effects of the accident. The rest of the boat's crew escaped without any hurt.

Captain Lyons, of the Raith, of Leith, while prosecuting the whale-fishery on the Labrador coast, in the season of 1802, discovered a large whale at a short distance from the ship. Four boats were dispatched in pursuit, and two of them succeeded in approaching it so closely together, that two harpoons were struck at the same moment. The fish descended a few fathoms in the direction of another of the boats, which was on the advance, rose accidentally beneath it, struck it with its head, and threw the boat, men, and apparatus, about fifteen feet into the air. It was inverted by the stroke, and fell into the water with its keel upwards. All the people were picked up alive by the fourth boat, which was just at hand, excepting one man, who, having got entangled in the boat, fell beneath it, and was drowned. The fish was soon afterwards killed.

When a ship has on board an ample cargo, or when the fogs set in, and the whales totally disappear, so as to put a period to the fishery for that season, there remains no sufficient motive to induce further stay in the country; the course of each ship is therefore directed immediately homeward. On the arrival of a fishing-ship at the port from whence she sailed, the mustering-officer of the customs repairs on board, receives the manifest of the cargo, (which is a kind of schedule in writing, containing all particulars respecting it,) with a true copy thereof, examines into the identity and number of the crew, by the usual form of mustering, and places an officer or two on board, to take charge of the cargo on the part of the revenue. The duty of these officers is to take account of every cask or other article of which the cargo consists, as it is discharged from the ship, and one of them accompanies the same to its destination, carrying an account thereof in writing, and not quitting the lighter, wherein it is contained, until he is relieved by another officer, who is placed in the capacity of landing-waiter on the premises where the blubber is warehoused or boiled.

Within twenty-four hours after the ship arrives in port, the master is required, under the penalty of one hundred pounds, to attend at the custom-house to make his report; that is, to make affidavit of the built, burden, and cargo of the ship he commands; on which occasion he must deliver his manifest to the collector or other chief officer, (if it has not before been demanded of him,) under the penalty of two hundred pounds. At the same time, the log-book must be produced, and its contents, as required by law, verified on the oath of the master and mate, and affidavit also made by the same persons of their faithful dealings according to the requirements of the law during the voyage. After these things are accomplished, the mustering-officer's certificate and schedule of the crew, the commissioners' license, and the affidavits of master and mate are transmitted to the commissioners, who, being satisfied of the faithfulness of all the proceedings, are required to order payment of the bounty on demand.

Previous to the cargo being admitted to

entry, free from the duties imposed on the produce of foreign fishery, the owner, importer, or consignee of the cargo, together with the master or commander of the vessel, must severally make oath, each to the best of his knowledge and belief, that the said cargo was the produce of fish, etc., actually caught by the crew of a British-built vessel, wholly owned by her Majesty's subjects, usually residing in Great Britain, etc., registered and navigated according to law. The importer or consignee of any goods imported into Britain is required, within twenty days after the master should have made his report, under certain penalties, to make a due entry with the collector or other chief officer of the customs, at the port where the ship shall arrive, of all the goods by him imported therein, and pay the full duties thereon.

CHAPTER IV.

ACCOUNT OF THE DAVIS'S STRAIT WHALE-FISHERY, WITH STATEMENTS OF EXPENSES AND PROFITS OF A FISHING-SHIP.

SHIPS intended for Davis's Strait commonly put to sea a little earlier than the Greenland ships. Some years ago, they were in the habit of sailing in the latter part of February, but at present they seldom leave their ports before the beginning or middle of March. On their passage outward, the Davis's Strait fishers usually touch at Orkney or Shetland, for the purpose of procuring men, and such trifling stores as are furnished at a cheap rate in these islands, together with a view of trimming and preparing their vessels for accomplishing the passage across the Atlantic. In consequence of the frequent storms and high seas which prevail in the spring of the year, the passage across the Atlantic is often attended with difficulty. The whalers are constantly liable to meet with icebergs, after passing the meridian of Cape Farewell, up to their arrival at the face of the ice connected with the shore of Labrador. In the night, or in thick weather, they are particularly hazardous, and especially in storms. In moderate winds, indeed, such an intimation of their proximity is to be obtained, either from their natural effulgence in some states of the atmosphere, or from their intense blackness in others, that they can be generally avoided. But in storms, when the ship ceases to be under command, they become one of the most appalling dangers which can be presented to the navigator.

Two most fatal shipwrecks occurred in the Davis's Strait fleets; the Royalist, captain Edmonds, and the London, captain Matthews, were lost, with all hands; the former among icebergs, in 1814, and the latter, as it is supposed, in a similar way, in 1817. Captain Bennet, of the Venerable, was in company with the Royalist immediately before she was wrecked. They fell in with drift-ice at eight A.M., April the 14th, when a heavy gale of wind commenced, and continued twelve hours, after which the wind abated, but suddenly veering to the north-west, a tremendous storm arose, which, accompanied with sleet and snow, continued without intermission during twenty hours. Before dark of the 15th, (nautical day,) captain Bennet saw several icebergs, at which time he believed the Royalist was lying to windward of an extensive chain of these islands of ice, among which she was wrecked in the course of the same night. The crew probably perished immediately, as the sea was uncommonly high. In the case both of the Royalist and the London subscriptions were generously opened at Hull, by the owners of the whalers, for the relief of the bereaved relatives of the crew.

The fishery on the coast of Labrador commences occasionally in the month of March. On this station, which is inhabited by a large description of whales, some fishers have persevered altogether, and have sometimes procured great cargoes. It is, however, a dangerous fishery. The nights being long and dark on their first arrival, they are obliged to use lanterns in their boats, when fish happen to be struck, or to remain unsubdued at close of day, for the purpose of keeping the ships and boats together ; on which occasions the stormy weather that frequently occurs at this season exposes them to continued danger. Those who prosecute the northern fishery, after making the ice at the "south-west," as the neighbourhood of the Labrador coast is usually denominated, proceed almost immediately up Davis's Strait towards Baffin's Bay. If in the month of April or beginning of May they commence this navigation, and sail along the edge of the western ice to the northward, they often find it joining the ice connected with the west coast of Greenland, in the latitude $66\frac{1}{2}°$ or $67°$, and meet with a considerable barrier of it in $68°$, immediately beyond which, a few leagues from land, is a good fishing-station. As the ice opens to the northward, the whales retreat in that direction, and the fishers follow as promptly as possible. The whalers often reach Disko early in May, but it is generally the latter end of this month, or the beginning of June, before they can pass the second barrier of ice, lying about Hare Island, in the 71st degree of latitude, and enter the northern inlets frequented by the whales. The three inlets called the South-east Bay, Jacob's Bight, and the North-east Bay, were most productive fishing-stations some years ago, but of late they have afforded but few whales. From hence, if no fish are found, the whalers proceed to the western part of the strait, towards Cumberland Island, or persevere along the east side of Davis's Strait towards Baffin's Bay, to the eastern parts of which the fish appear to retreat as the season advances, and as the ice clears away from the northern and eastern shores.

In Baffin's Bay, and in the inlets of West Greenland, the fishery is conducted under the most favourable circumstances. The water being shallow in many situations, the boats require only a small quantity of line, and the weather being warm, the sailors perform their operations, if not with pleasure, at least with comfort to themselves. But at the south-west, each operation of the fishery is performed under rather unpleasant and even dangerous circumstances. Darkness of night, exposure to storms, and frequency of swells, are all unfavourable to the fishers. The flensing of a whale at the south-west is usually more troublesome and more hazardous than elsewhere, owing to the prevalent swell, which rarely altogether subsides.

Davis's Strait fishers, within the present century, after making a successful fishery at a distance from land, have been in the habit of resorting to the bays, there mooring in safety, until the troublesome process of making-off was accomplished. On the passage homewards, the ships usually steer down the middle of the strait, and proceed sufficiently far south for avoiding the "Cape-ice," before they haul up to the eastward. From thence, the prevalence of westerly winds in the summer season generally affords them an easy passage across the Atlantic. The legislative regulations on the importation of Davis's Strait produce are the same as on cargoes obtained in the Greenland fishery.

Among the Dutch fishers, we find that, during a period of a hundred and seven years, included between 1669 and 1778, each ship in a fleet of a hundred and thirty-two sail, which proceeded annually to Greenland, afforded to the owners, on an average, a profit of 3,126 florins; and that, in a period of sixty years, ending with 1778, a fleet of fifty-three ships, which sailed annually to Davis's Strait, realized to the owners a profit of 3,469 florins per voyage; thus exceeding the produce of the Greenland fishery by 343 florins on each ship, per voyage, after ample allowance is made for the greater length of the voyage to Davis's Strait, together with the additional wear and tear. Among the British fishers, the advantage seems also to have been on the side of Davis's Strait, particularly of late years. But if we deduct the value of skins taken by the Greenland fishers, but not estimated in their cargoes, say £20 to £30 per ship, and the additional expenses of a Davis's Strait voyage, occasioned by the greater wear and tear, and the provisions and wages for a voyage, longer by one or two months than that to Greenland, we shall reduce the balance in favour of the Davis's Strait fishers to a very small sum.

During the four years, ending with 1817, the amount of the cargoes of the British Greenland whale-fishing ships, (consisting of three hundred and seventy-six sail, repeated voyages included,) was 3,508 whales, which produced 33,070 tuns of oil, and 1,682 tons of whalebone. At the same time, 210 ships employed in the Davis's Strait fishery procured 1,522 whales, yielding 21,438 tuns of oil, and 1,015 tons of whale-fins. It seems worthy of remark, that the whales caught near Spitzbergen afforded a larger proportion of whalebone, compared with the quantity of oil, than the fish of Davis's Strait; the Greenland fish yielding a ton of fins for every 19½ tuns of oil, and the Davis's Strait fish a ton of fins for every 21 tuns of oil. It is remarkable that this should have been the case, when we consider that small fish afford less whalebone than large fish in proportion to their produce in oil, and yet the Greenland fish, which, on the average of four years, were much smaller than those caught in Davis's Strait, have produced the largest proportion of whalebone. The whales taken at the Greenland fishery in four years only average 9½ tuns of oil each, but those caught at Davis's Strait average 14 tuns. It would, therefore, appear that the large whales caught near Spitzbergen are much stouter than those taken in Davis's Strait, and afford such a large proportion of fins as more than compensates for the deficiency in the small whales.

The fluctuating value of shipping renders it difficult to give a fair estimate of the expenses of a whale-ship. The Resolution, of Whitby, burden 219 tons, when new, in the year 1803, cost but £7,791, including all expenses of stores and outfit, premiums of insurance, and advanced money of seamen; while the Esk, of 354 tons of measurement, launched and fitted out at the same port in 1813, cost about £14,000. The ship Resolution was sold in eight shares, and the sums subscribed by the owners and deposited in the hands of the managing owners was £8,000. The balance in favour of the owners of the Resolution for fifteen voyages appeared to be £19,473. 10*s.* 2*d.*, besides the value of the ship, and the value of the outfit for the sixteenth voyage. If we reckon these at £6,520, the profit derived from £8,000, originally advanced, in addition to the interest of the capital embarked, will amount to £26,000, notwithstanding the last three voyages were but indifferent, of which sum £25,200 has actually been divided. It is, however, necessary to mention, that the Resolution, in her first ten voyages, procured six hundred or seven hundred tuns of oil above the average of the fishery during that period, if not more.

The usual expenses of a Greenland voyage, including outfit, when no cargo is obtained, may be stated at £2,200, exclusive of interest of capital and wear and tear. For every ten tuns of oil procured, there will be an additional expense of £80 or £90 for discharging and boiling the cargo, for oil money and fish money, and for other extraordinaries connected with a successful fishing. Thus the expense of a ship, with a cargo of two hundred tuns of oil, will be at least £4,000.

CHAPTER V.

METHOD OF EXTRACTING OIL AND PREPARING WHALEBONE, WITH A DESCRIPTION OF THESE ARTICLES, AND REMARKS ON THE USES TO WHICH THE SEVERAL PRODUCTS OF THE WHALE-FISHERY ARE APPLIED.

On the margin of the river, wet dock, canal, or other sheet of water, communicating with that wherein the whale-fishing ship discharges her cargo, are usually provided the necessary premises for reducing the blubber into oil, consisting commonly of the following articles.

1. A copper vessel or boiler, three to six, or even ten or more tuns' capacity, of a circular form in the horizontal view, and elliptical in the perpendicular section, is fixed at the elevation of six to ten feet above the ground, provided with an appropriate furnace, and covered with a tiled or slated shed.

2. On the same, or on a little lower level than that of the copper, is fixed a square or oblong back or cooler, built of wood generally, capable of containing from ten to twenty tuns of oil, or upwards. Adjoining to this is another back, sometimes a third, and occasionally a fourth or fifth, each placed a little lower than

the one preceding it, so that the lowest shall stand with its base about two or three feet above the level of the ground. In some very modern *works*, the coolers are all fixed at the same elevation. Each of the backs is provided with one or more stop-cocks on the most accessible side, for convenience in drawing the oil off into casks.

3. Altogether above the level of the copper, and immediately adjoining it, on the side directed towards the river or canal, an oblong wooden cistern, called the "starting-back," is usually erected, for containing blubber, which ought to be a vessel of equal, or nearly equal, capacity to that of the copper. It is generally provided with a crane, which, with a winch, or other similar engine attached, is so contrived as to take casks either from the quay, or from a lighter by the side of the quay, and convey them at once to the top of the starting-back. Over this vessel is extended a kind of railing or "gauntree," on which the casks rest without being injured, and are easily movable.

4. The starting-back being elevated two or three yards above the level of the ground, occasionally admits of a "fenk-back," or depository, for the refuse of the blubber, immediately beneath it; which fenk-back is sometimes provided with a *clough* on the side next the water, for "starting" the fenks into a barge or lighter placed below.

5. The premises likewise comprise a *shed* for

the cooper, and sometimes a cooper's, or master-boiler's, dwelling-house; the inhabitant of which takes the charge of all the blubber, oil, whalebone, and other articles deposited around him.

6. Warehouses for containing the oil after it is drawn off into casks are also used, not only for preserving it in safe custody, but for defending the casks from the rays of the sun, otherwise they are apt to pine and become leaky, and,

7. Sometimes "steeping-backs" and apparatus for preparing whalebone are comprised within the same inclosure.

The blubber, which was originally in the state of fat, is found, on arrival in a warm climate, to be in a great measure resolved into oil. The casks, containing the blubber, are conveyed, by the mechanical apparatus above mentioned, to the top of the starting-back, into which their contents are emptied or *started* through the bungholes. When the copper is properly cleansed, the contents of the starting-back, on lifting a clough at the extremity, or turning a stop-cock, fall directly into the copper, one edge of which is usually placed beneath. The copper is filled within two or three inches of the top, a little space being requisite to admit of the expansion of the oil when heated; and then a brisk fire is applied to the furnace, and continued until the oil begins to boil. This effect usually takes place in less than two hours. Many of the fritters or fenks float on the surface of the oil before it is heated, but after it is "boiled off," the whole, or nearly so, subside to the bottom. From the time the copper begins to warm until it is boiled off, or ceases to boil, its contents must be incessantly stirred by means of a pole, armed with a kind of broad, blunt chisel, to prevent the fenks from adhering to the bottom or sides of the vessel. When once the contents of the copper boil, the fire in the furnace is immediately reduced, and shortly afterwards altogether withdrawn. Some persons allow the copper to boil an hour, others during two or three hours. The former practice is supposed to produce finer and paler oil, the latter a greater quantity. The same copper is usually boiled twice in every twenty-four hours, Sundays excepted. After the oil has stood to cool and subside, the "bailing" process commences. One of the backs or coolers having been prepared for the reception of the oil, by putting into it a quantity of water, for the double purpose of preventing the heat of the oil from warping or rending the back, and for receiving any impurities which it may happen to hold in suspension, a wooden spout, with a large square box-like head, which head is filled with brushwood or broom, that it may act as a filter, is then placed along from "the copper-head" to the cooler, so as to form a communication between the two. The oil in the copper being now separated from the fenks, water, and other impurities, all of which have subsided to the bottom, is in a great measure run off through the pipe communicating with the cooler, and the remainder is carefully lifted in copper or tin ladles, and poured upon the broom in the spout, from whence it runs into the same cooler, or any other cooler, at the pleasure of the "boilers."

Besides oil and fenks, the blubber of the whale likewise affords a considerable quantity of watery liquor, produced probably from the putrescence of the blood, on the surface of which some of the fenks, and all the greasy animal matter, called foot-je, or footing, float, and upon the top of these the oil. Great care therefore is requisite, on approaching these impure substances, to take the oil off by means of shallow tinned iron or copper ladles, called "skimmers," without disturbing the refuse and mixing it with the oil. There must always, however, be a small quantity towards the conclusion, which is a mixture of oil and footing; such is put into a cask or other suitable vessel by itself, and when the greasy part has thoroughly subsided, the most pure part is skimmed off and becomes fine oil, and the impure is allowed to accumulate by itself, in another vessel, where in the end it affords "brown-oil." From a ton, or 252 gallons by measure of blubber, there generally arises from fifty to sixty gallons of refuse, whereof the greater part is a watery fluid. The constant presence of this fluid, which boils at a much lower temperature than the oil, prevents the oil itself from boiling, which is probably an advantage, since, in the event of the oil being boiled, some of the finest and most inflammable parts would fly off in the form of vapour, whereas the principal part of the steam, which now escapes, is produced from the water. Some persons make a practice of adding a quantity of water, amounting perhaps to half a tun, to the contents of each copper, with the view of weakening or attenuating the viscid impurities contained in the blubber, and thus obtaining a finer oil; others consider the quantity of watery fluid already in the blubber, as sufficient for producing every needful effect.

Each day, immediately after the copper is emptied, and while it is yet hot, the men employed in the manufacture of the oil, having their feet defended by strong leathern or wooden shoes, descend into it, and scour it out with sand and water, until they restore the natural surface of the copper wherever it is discoloured. This serves to preserve the oil from becoming high-coloured, which will always be the case when proper cleanliness is not observed.

When prepared and cooled, the oil is in a marketable state, and requires only to be transferred from the coolers into casks, for the convenience of conveyance to any part of the country. Each of the coolers, it has been observed, is furnished with a stop-cock, beneath which there is a platform adapted for receiving the casks. At the conclusion of the process of boiling each vessel's cargo manufactured on the premises, the backs are completely emptied of their contents. To effect this water is poured in, until the lower part of the stratum of oil rises within a few lines of the level of the stop-cock, and permits the greatest part of the oil to escape. The quantity left amounts, perhaps, to half an inch or an inch in depth; to recover this oil without water requires a little address. A deal board, in length a little exceeding the breadth of the cooler, is introduced at one end, diagonally, and placed, edgeways, in its contents. The ends of the board being covered with flannel, when pressed forcibly against the two opposite sides of the cooler, prevent the oil from circulating past. The board is then advanced slowly forward towards the part of the back where the stop-cock is placed, and, in its progress, all the oil is collected by the board, while the water has a free circulation beneath it. When the oil accumulates to the depth of the board, its further motion is suspended until the oil thus collected is drawn off. Another similar board is afterwards introduced, at the furthest extremity of the cooler, and passed forward in the same manner, whereby the little oil which escapes the first is collected. The remnant is taken up by skimmers. The smell of oil during its extraction is undoubtedly disagreeable; but, perhaps, not more so than the vapour arising from any other animal substance, submitted to the action of heat when in a putrid state. It is an erroneous opinion that a whale-ship must always give out the same unpleasant smell. The fact is, that the fat of the whale, in its fresh state, has no offensive flavour whatever, and never becomes disagreeable until it is brought into a warm climate, and becomes putrid.

Whale-oil, prepared by the method just described, is of a pale honey-yellow colour; but sometimes, when the blubber from which it is procured happens to be of the red kind, the oil appears of a reddish-brown colour. When first extracted, it is commonly thick, but after standing some time a mucilaginous substance subsides, and it becomes tolerably limpid and transparent. Its smell is somewhat offensive, especially when it is long kept. It consists of oil, properly so called, a small portion of spermaceti, and a little gelatine. At the temperature of 40° the latter substances become partially concrete, and make the oil obscure; and at the temperature of 32° render it thick with flaky crystals. It is sold by the tun, of 252 gallons, wine measure. Its specific gravity is 0·9214. The tun weighs 17 cwt. 1 qr. 1 lb. 12 oz. 14 dr. The value of whale-oil, like that of every other similar article, is subject to continual variations. In the year 1744, oil sold in England for £10. 1s. per tun; in 1754, for £29; in 1801, for £50; in 1807, for £21; and in 1813, when the price was the highest ever obtained, for £55 or £60 per tun.

The application of gas, produced by the distillation of coal, for lighting the public streets and buildings, manufactories, shops, etc., which formerly were lighted with oil, it was apprehended would be ruinous to the whale-fishery trade, and certainly had a very threatening appearance; but hitherto, owing to the amount of whale-oil lately imported having been less than the ordinary quantity, this expected effect of the employment of gas-lights has not been felt

When blubber is boiled in Greenland, the oil produced from it is much brighter, paler, more limpid, and more inflammable than that extracted in Britain. It is also totally free from any unpleasant flavour, and burns without smell. Hence it is evident, that whatever is disagreeable in the effluvia of whale-oil arises from an admixture of putrescent substances. These consist of blood and animal fibre. This latter is the reticulated and cellular fibres of the blubber, wherein the oil is confined, which produces the fenks when boiled. When putrefaction commences, a small portion of the blood contained in the blubber is probably combined with the oil, and the animal fibre, in considerable quantity, is dissolved in it. These substances not only occasion the unpleasant smell common to whale-oil, but, by being deposited on the wick of lamps, in burning, produce upon it a kind of cinder, which, if not occasionally removed, causes a great diminution in the quantity of light. A sample of oil, which I extracted in Greenland, about ten years ago, is still fine, and totally free from rancidity. It has certainly acquired a smell, but is not more unpleasant than that of old Florence oil. Hence, were whale-oil extracted in Greenland before the putrefying process commences, or were any method devised of freeing it from the impurities which combine with it in consequence of this process, it would become not only more valuable for common purposes, but would be applicable to almost every use to which spermaceti oil is adapted. In fact, it would become a similar kind of article.

In performing some experiments on oil in Greenland, during the fishing season of 1818, I adopted a process for refining oil extracted from blubber before the putrefying process commenced, by which I procured a remarkably fine oil. It was nearly colourless, beautifully transparent, and very limpid. This oil retains its transparency, even at a very low temperature. It is more inflammable than spermaceti oil, and so pure, that it will burn longer, without forming a crust on the wick of the lamp, than any other oil with which it has been compared.

Besides the oil produced from blubber by boiling, the whalers distinguish such as oozes from the jawbones of the fish by the name of jawbone oil; and inferior oils, which are discoloured, by the denominations of brown oil and black oil, or bilge oil. Brown oil is produced in the way described in the process of boiling; black or bilge oil is that which leaks out of the casks in the course of the voyage, or runs out of any blubber which may happen to be in bulk, and accumulates in the bottom of the ship. This oil is always very dark coloured, viscous, and possessed of little transparency.

Whalebone, or whalefins, as the substance is sometimes, though incorrectly, named, is found in the mouth of the common Greenland whale, to which it serves as a substitute for teeth. It forms an apparatus most admirably adapted as a filter for separating the minute animals on which the whale feeds from the sea-water in which they exist. The Lawgiver of all the creatures, whether rational or irrational, has fitted them with organization appropriate for the purposes for which they live, and has provided them with all that is needful, according to their rank, for the happiness of their lives. The care which is bestowed upon the animals who do not recognise Him is in unison with that more tender kindness which he has manifested to such as have a mind to meditate on his perfections, and a heart wherewith to love him and adore.

The whalebone is a substance of a horny

appearance and consistence, extremely flexible and elastic, generally of a bluish black colour, but not unfrequently striped longitudinally white, and exhibiting a beautiful play of colour on the surface. Internally, it is of a fibrous texture, resembling hair, and the external surface consists of a smooth enamel, capable of receiving a good polish. When taken from the whale, the whalebone consists of laminæ, connected by what is called the gum in a parallel series, and ranged along each side of the mouth of the animal. The laminæ are about three hundred in number, in each side of the head. The length of the longest blade, which occurs near the middle of the series, is the criterion fixed on by the fishers for designating the size of the fish. Its greatest length is about fifteen feet. The two sides or series of the whalebone are connected at the upper part of the head or crown-bone of the fish, within a few inches of each other, from whence they hang downwards, diverging so far as to inclose the tongue between their extremities; the position of the blades with regard to each other resembles a frame of saws in a saw-mill; and, taken altogether, they exhibit in some measure the form and position of the roof of a house. The smaller extremity and interior edge of each blade of whalebone, or the edge annexed to the tongue, are covered with a long fringe of hair, consisting of a similar kind of substance to that which constitutes the interior of the bone. Whalebone is generally brought from Greenland in the same state as when taken from the fish, after being divided into pieces, comprising ten or twelve laminæ in each. Of late years, the price has usually been fluctuating between £50 and £150 per ton. It becomes more valuable as it increases in length and thickness.

In cleansing and preparing the whalebone, the first operation, if not already done, consists of depriving it of the gum. It is then put into a cistern containing water, till the dirt upon its surface becomes soft. When this effect is sufficiently produced, it is taken out piece by piece, laid on a plank placed on the ground, where the operator stands, and scrubbed or scoured with sand and water, by means of a broom or piece of cloth. It is then passed to another person, who, on a plank or bench, elevated to a convenient height, scrapes the root-end, where the gum was attached, until he produces a smooth surface; he, or another workman, then applies a knife or a pair of shears to the edge, and completely detaches all the fringe of hair connected with it. Another person, who is generally the superintendent of the concern, afterwards receives it, washes it in a vessel of clean water, and removes with a bit of wood the impurities out of the cavity of the root. Thus cleansed, it is exposed to the air and sun, until thoroughly dry, when it is removed into a warehouse or other place of safety and shelter.

Before it is offered for sale, it is usually scrubbed with brushes and hair-cloth, by which the surface receives a polish, and all dirt or dust adhering to it removed; and, finally, it is packed in portable bundles, consisting of about one hundred weight each. The size-bone, or such pieces as measure six feet or upwards in length, are kept separate from the under size, the latter being usually sold at half the price of the former. Each blade being terminated with a quantity of hair, there is sometimes a difficulty in deciding whether some blades of whalebone are size or not. Owing to the diminished value of under-sized bones, and more particularly in consequence of the captain and some of the officers engaged in a fishing-ship having a premium on every size fish, it becomes a matter of some importance in a doubtful case to decide this point. From a decision which, I understand, has been made in a court of law, it is now a generally received rule, that so much of the substance terminating each blade as gives rise to two or more hairs is whalebone; though in fact the hair itself is actually the same substance as that of which the whalebone is composed.

The oil produced from the blubber of the whale, in its most common state of preparation, is used for a variety of purposes. It is used in the lighting of the streets of towns, and the interior of places of worship, houses, shops, manufactories, etc.; it is extensively employed in the manufacture of soft soap, as well as in the preparing of leather and coarse woollen cloths; it is applicable in the manufacture of coarse varnishes and paints, in which, when duly prepared, it affords a strength of body more capable of resisting the weather than paint mixed in the usual way with vegetable oil; it is also extensively used for reducing friction in various kinds of machinery; combined with tar, it is much employed in ship-work, and in the manufacture of cordage, and either simple, or in a state of combination, it is applied to many other useful purposes.

One of the most extensive applications of whale-oil, that for illumination, has suffered a considerable diminution, in consequence of the appropriation of gas from coal to the same purpose. This discovery, brilliant as it is acknowledged to be, which in its first application bore such a threatening aspect against the usual consumption of oil, may be the means of bringing the oil of the whale into more extensive use than it has at any former period been. Whale-oil, in the most inferior qualities, is found to afford a gas which, in point of brilliancy, freeness of smell, and ease of manufacture, is greatly superior to that produced from coal. In places where coal is not very cheap, gas, it seems, can be produced from oil at about the same expense as coal-gas; consequently, the numerous advantages of the former will render it highly preferable. Whale-oil, when free from the incombustible and contaminating animal matters which are usually dissolved in it in consequence of putrefaction, is, then, applicable to a variety of purposes, in which the common oil cannot conveniently be employed. Even in its unrefined state, whale-oil frequently obtains an unmerited bad character for burning, when the fault lies in those who have the charge of the lamps in which it is consumed. Want of proper cleanliness, the use of wicks of too great diameter, and sometimes in a damp state, are common errors inimical to the obtaining of a good light.

The fenks, or ultimate refuse of the blubber of the whale, form an excellent manure, especially in soils deficient in animal matter. Fenks might be used, it is probable, in the manufacture of Prussian blue, and also for the production of ammonia. Footing, which is the finer detached fragments of the fenks, not wholly deprived of oil, may be used as a cheap material in the formation of gas. Whale's tail can be converted into glue, and is extensively used in the manufacture of this article, especially in Holland. It forms, as I have already mentioned, chopping-blocks for the fishers. The jawbones, with the skull or crown-bone of the whale, are the largest found in nature. They are sometimes met with of the length of twenty-five feet. Jawbones are used as the ribs of sheds, and in the construction of arches and posts of gateways.

Whalebone, when softened in hot water, or simply by heating it before a fire, has the property of retaining any shape which may then be given to it, provided it be secured in the required form until it becomes cold. This property, together with its great elasticity and flexibility, renders it capable of being applied to many useful purposes. The first way in which it seems to have been employed was in the stays of ladies. Its application to this purpose was at one period, when the quantity imported was small, so general that it attained, in the wholesale way, the price of £700 per ton. Of late years, however, it has fallen somewhat into disrepute, some ladies preferring to support themselves with plates of steel. There has been for many years an extensive consumption of this article in the manufacture of umbrellas and parasols. The white enamel (found in some specimens of whalebone) has been fabricated into ladies' hats, and a variety of ornamental forms of head-dresses; and the black enamel is employed, in the same way as cane, in the construction of the seats or backs of chairs, gigs, sofas, etc. The hair on the edge of the whalebone answers every purpose of bullock's hair in stuffings for chairs, sofas, settees, carriages, mattresses, cushions, etc. An attempt has been made to build whale-boats of this material, but the great alteration which takes place in its dimensions, in different states of the atmosphere, on account of its ready absorption of moisture, renders it inapplicable. It has been used with a much better effect, in the construction of portmanteaus, travelling-trunks, hygrometers, the ram-rods of fowling-pieces, fishing-rods, the shafts, springs, and wheels of carriages, and various other articles.

CHAPTER VI.

NARRATIVE OF PROCEEDINGS ON BOARD THE SHIP ESK, DURING A WHALE-FISHING VOYAGE TO THE COAST OF SPITZBERGEN, IN THE YEAR 1816; PARTICULARLY RELATING TO THE PRESERVATION OF THE SHIP UNDER CIRCUMSTANCES OF PECULIAR DANGER.

THE ship Esk sailed from Whitby on the 29th of March, 1816. We entered the frigid confines of the Icy Sea, and killed our first whale on the 25th of April. On the 30th of April, we forced into the ice with a favourable wind, and after passing through a large body of it, entered an extensive sea, such as usually lies on the western coast of Spitzbergen at this season of the year, early on the morning of the following day. The wind then blowing hard south south-east, we kept our reach to the eastward until three o'clock in the afternoon, when we unexpectedly met with a quantity of ice, which interrupted our course. We then *wared* by the way of avoiding it, but soon found, though the weather was thick with snow, that we were completely embayed in a situation that was truly terrific.

In the course of fourteen voyages, in which I had before visited this inhospitable country, I passed through many dangers wherein my own life, together with those of my companions, had been threatened; but the present case, where our lives seemed to be at stake for a length of time, exceeding twelve hours, far surpassed in awfulness, as well as actual hazard, anything that I had before witnessed. Dangers which occur unexpectedly and terminate suddenly, though of the most awful description, appear like a dream when they are past; but horrors which have a long continuance, though they in some measure decrease in their effect on the mind by a lengthened contemplation of them, yet they leave an impression on the memory which time itself cannot altogether efface. Such was the effect of the present scene. Whilst the wind howled through the rigging with tempestuous roar, the sea was so mountainous that the mast-heads of some accompanying ships, within the distance of a quarter of a mile, were intercepted and rendered invisible by the swells, and our ship frequently rolled the lee-boats into the water, that were suspended with their keels above the roughtree-rail!

At the same time, we were rapidly approaching a body of ice, the masses of which, as hard as rocks, might be seen at one instant covered with foam, the next concealed from the sight by the waves, and instantly afterwards reared to a prodigious height above the surface of the sea. It is needless to relate the means by which we attempted to keep the ship clear of the threatened danger, because those means were without avail. At eleven P.M. we were close to the ice, when perceiving through the mist an opening a short distance within, we directed the drift of the ship towards it. As we approached the ice, the sails were filled, so that the first blow was received obliquely on the bow, when the velocity of the ship was moderate. In this place the pieces of ice were happily of smaller dimensions; at least, all the larger masses we were able to avoid, so that, after receiving a number of shocks, we escaped without any particular accident into the opening or slack part of the ice above noticed. This opening, as far as we could see, promised a safe and permanent release.

But in this we were grievously disappointed: for, when we attempted to ware the ship, which soon became necessary, she refused to turn round, notwithstanding every effort, in a space which, in ordinary circumstances, would have been far more than sufficient for the evolution. In consequence of this accident, which arose partly from the bad *trim* of the ship, and partly from the great violence of the wind, she fell to leeward into a close body of ice, to which we could see no termination. The Mars, of Whitby, and another vessel, which closely followed us as we penetrated the exterior of the ice, being in better trim than the Esk, performed the evolution with ease, and were in a few minutes out of sight. In this dreadful situation, we lay beating against the opposing ice, with terrible force, during eight successive hours, all which time I was rocked at the top-gallant mast-head, directing the management of the sails, to avoid the largest masses of ice, any one of which would have perforated the side of the ship. By the blessing of God, we succeeded wonderfully; and at eight A.M., the 2nd of May, gained a small opening, where we contrived to navigate the ship until the wind subsided, and we had the opportunity of forcing into a more commodious place. On examining the ship, we found our only apparent damage to consist in the destruction of most of our rudder works, a few slight bruises on the sides, and a cut on the lower part of the stern of the ship.

From this time, to the 20th of May, the fishery was generally interrupted by the formation of new ice, insomuch that during this interval we killed but one whale, while few of our neighbours succeeded so well. During the succeeding week, we became so fixed that we never moved except occasionally a few yards. The next twelve days were spent in most arduous labour in forcing the ship through the ice. At length, on the 12th of June, we happily escaped, though our companions were, for a short time, all left behind. On the 27th of June, we had secured thirteen fish, and our quantity of oil was about 125 tuns. This was a larger cargo than any ship had procured that we had yet met with, excepting only one. On the 28th, the John, of Greenock, commanded by my brother-in-law, Mr. Jackson, joined us.

After proceeding to the westward, the greater part of the 28th, we arrived at the borders of a compact body of field-ice, consisting of immense sheets of prodigious thickness. As I considered the situation not favourable for fishing, the ship was allowed to drift to the eastward all night. In the morning of the 29th, I found, however, that she was very little removed from the place where she lay when I went to bed. I perceived that the floes, between which there had been extensive spaces, were now in the act of closing; and attempted, by lowering four boats, to tow the ship through an opening at a short distance from us. At the moment when we were about to enter it, it closed. In attempting to get the ship into the safety of an indentation, which appeared calculated to afford a secure retreat, a small piece of ice came athwart her bow, stopped her progress, and she was in a minute afterwards subjected to a considerable squeeze. From none, however, of the pieces of ice around us did we apprehend any danger, particularly as the motion of the ice soon abated. There was a danger, however, on the larboard quarter, of which we were totally unconscious. The piece of ice that touched the ship in that part, though of itself scarcely six yards square, and more than one yard above the water, concealed beneath the surface of the sea, at the depth of ten or twelve feet, a hard pointed projection of ice, which pressed against the keel, lifted the rudder, and caused a damage that had nearly occasioned the loss of the ship. About an hour and a half after the accident, the carpenter, having sounded the pump, discovered to our great concern and amazement a depth of eight and a half feet water in the hold. This was most alarming; with despair pictured in every face, the crew set on the pumps; a signal of distress was at the same time hoisted, and a dozen boats approached us from the surrounding ships. In the space of four hours, the water had lowered to nearly four feet, but one of the pumps becoming useless, and bailing being less effectual than at first, the water once more resumed its superiority and gained upon us.

Something, therefore, was now to be done, to stop, if possible, the influx of the water. As the pumping and bailing could not possibly be continued by our own ship's company, it was necessary to make use of some means to attempt a speedy remedy whilst our assistants were numerous. As there was a probability that a bunch of rope-yarns, straw, or oakum, might enter some of the larger leaks, and retard the influx of water, if applied near the place through the medium of a fothering-sail, (that is, a sail drawn by means of ropes at the four corners, beneath the damaged or leaky part,) we in the meantime prepared a lower studding-sail, by sewing bunches of these materials, which, together with sheets of old thin canvas, whalebone-hair, and a quantity of ashes, fitted it well for the purpose. Thus prepared, it was hauled beneath the damaged place, but not the least effect was yet produced. We set about unrigging the ship, and discharging the cargo and stores, upon a flat place of the floe, against which we had moored, with the intention of turning the ship keel upward. My own sailors were completely worn out, and most of our auxiliaries wearied and discouraged ; some of them evinced, by their improper conduct, their wish that the ship should be abandoned. Before putting our plan in execution, we placed twenty empty casks in the hold, to act against a quantity of iron ballast which was in the ship, caulked the dark lights, removed all the dry goods and provisions that would injure with the wet, secured all the hatches, skuttles, companion, etc., then, erecting two tents on the ice, one for sheltering myself, and the other for the crew, we ceased pumping, and permitted the ship to fill. At this crisis, men of whom I had conceived the highest opinion for firmness and bravery greatly disappointed my expectations. Among the whole crew, indeed, scarcely a dozen spirited fellows were to be seen.

As no ship could with propriety venture near us, to assist in turning the Esk over, on account of the hazardous position of the ice around her, we had no other means of attempting this singular evolution than by attaching purchases to the ice from the ship. Everything being prepared, while the water flowed into the ship, I sent our exhausted crew to seek a little rest. For my own part, necessity impelled me to endeavour to obtain some repose. I had already been fifty hours without rest, which unusual exertion, together with the anxiety of mind I endured, caused my legs to swell and become so extremely painful, that I could scarcely walk. Spreading, therefore, a mattress upon a few boards, laid on the snow within one of the tents, notwithstanding the coldness of the situation, and the excessive dampness that prevailed from the constant fog, I enjoyed a comfortable repose of four hours, and arose considerably refreshed.

Immediately afterwards, about three P.M., on the 1st of July, I proceeded with all hands to the ship, which, to our surprise, we found had only sunk a little below the sixteenth mark externally, while the water but barely covered a part of "'tween decks within." Perceiving that it was not likely to sink much further, on account of the buoyancy of the empty casks, and the materials of which the ship was composed, we applied all our purchases, but with the strength of 150 men we could not heel her more than five or six stakes. When thus careened, with the weight of two anchors suspended from the mast, acting with the effect of powerful levers on the ship, I accompanied about 120 men on board. All these being arranged on the high side of the deck, ran suddenly to the lower side, when the ship fell so suddenly on one side that we were apprehensive she was about to upset, but after turning a little way the motion ceased. The tackles on the ice being then hauled tight, the heeling position of the ship was preserved, until we mounted the higher part of the deck, and ran to the lower as before. At length, after a few repetitions of this manœuvre, no impression whatever was produced, and the plan of upsetting the ship appeared quite impracticable.

The situation of the ship being now desperate, there could be no impropriety in attempting to remove the keel and garboard strake, which prevented the application of the fothering, for, whatever might be the result, it could scarcely be for the worse. These incumbrances being removed, the sail for fothering was immediately applied to the place, and a vast quantity of fothering materials thrown into its cavity, when it was fairly underneath. Over this sail we spread a fore-sail, and braced the whole as tight to the ship as the keel-bolts, which yet remained in their horizontal position, would admit. The effect was as happy as we could possibly have anticipated. Some time before all these preparations were completed, our people, assisted by the John's crew, who, after a short rest, had returned to us, put the three pumps and bailing tubs in motion, and applied their energies with such effect that in eleven hours the pumps sucked! In this time, a depth of thirteen feet water was pumped out of the hold, besides the leakage. The John's crew on this occasion exerted themselves with a spirit and zeal which were truly praiseworthy. As the assistance of carpenters was particularly needed, we fired a gun, and repeated our signal of distress, which brought very opportunely two boats, with six men each, from the Prescot, and the same number from our tried friend, Mr. Allen, of the North Britain. As we likewise procured the carpenters of these ships, together with those of the John, they commenced operations by cutting through the ceiling, between two frames of timbers directly across the hold, at the distance of about twenty-six feet from the stern-post; a situation which, we were assured, was on the fore part of the leak, or between the leak and the body of the ship. The timbers in this place were unhappily found so closely connected that we had to cut away part of one of the floors, that we might come at the outside plank, and caulk the crevices between it and the timbers; which operation, on account of the great depth of timber, and the vast flow of water that issued at the ceiling, was extremely difficult, tedious, and disagreeable.

Meanwhile that we had good assistance, I allowed our crew four hours' rest, half of them at a time, for which purpose some of their beds were removed from the ice to the ship. Here, for the first time during four days, they enjoyed their repose; for on account of the cold and damp that prevailed when they rested on the ice, several of them, I believe, never slept. Some of the John's people returning to us, swayed up the topmast, and rigged most of the yards, while our men were employed stowing the main-hold, which, by the floating of the casks, was thrown into a singular state of disorder. Some of the casks were found without heads, and all the blubber lost, and many were found bilged, or otherwise damaged.

After the carpenters had completely cleared the roomstead—that is, the space between any two ribs or frames of timbers in a ship—they drove oakum into it, along with an improved woollen sheathing substance; and occasionally, where the spaces were very large, pieces of fat pork. The spaces or crevices between the planks of the ceiling and the timber being then filled, all the above substances were firmly driven down by means of pine wedges, and the spaces between each of the wedges caulked. This would have been very complete, had not the increased flow of the water overcome the pumps, and covered the ceiling where the carpenters were at work. They were therefore obliged to wedge up the place with great expedition; and being at the same time greatly fatigued, the latter part of the operation was accomplished with much less perfection than I could have wished.

Hitherto calm weather, with thick fog, having constantly prevailed, was the occasion of several ships remaining by us and affording assistance, which would otherwise have left us. But the weather having now become clear, and a prospect of prosecuting the fishery being presented, every ship deserted us, except the John, and she was preparing to leave us likewise. In the state of extreme jeopardy in which we were still placed, the love of life, on the part of the crew, determined them to attempt to quit the ship, and take refuge in the John as soon as she should attempt to leave us. I was confident, through the information I had received, that unless the assistance of the John were secured, the Esk, after all the labour bestowed on her, and the progress which had been made towards her preservation, must yet be abandoned as a wreck. At length, I yielded to the request of my whole crew, and made a proposal to captain Jackson, who agreed on certain conditions, involving the surrender of a large proportion of our cargo, to stay by us and assist us until our arrival at some port of Shetland. The original of this contract was voluntarily signed by every individual of both ships' companies. A subsequent agreement of a more explicit kind, on the part of masters and owners of the Esk and the John, was drawn out and signed by myself and Mr. Jackson.

These agreements being fully understood and signed, the John hauled alongside of the ice, which had now opened near the Esk for the first time since the accident, and took on board the whole of our loose blubber, estimated at seventy-eight butts and fifty-eight butts, in twenty-five casks, together with half our whalebone, as agreed. Everything now went on favourably, and whilst our crew and assistants were in full and vigorous employment, I retired to seek that repose which my wearied frame stood greatly in need of. On the 5th July, assisted by all hands from the John, the stowing of the hold and the rigging of the ship were completed, and, under a moderate breeze of wind, we left the floe, but what was our astonishment and mortification to find that the ship could not be guided! The rudder had become perfectly useless, so that with the most appropriate disposition of the sails possible, and the requisite position of the helm, the ship could not be turned round, or diverted in the least from the course in which the impetus of the wind on the sails was the most naturally balanced. This was an alarming disappointment. However, as the ship was in such constant danger of being crushed in the situation where she lay, the John, with the greatest difficulty imaginable, towed us three or four miles to the eastward, into a place of comparative safety. Here we rectified our rudder, and arranged for the trimming of the ship more by the stern, to compensate in some degree for the loss of the after-keel. When these matters were completed, on account of strong wind and thick weather, we could not, without imminent danger, attempt to penetrate the compact body of ice which at this time barred our escape to the sea, and I took the advantage of the opportunity to procure a long rest. The attention of the carpenters in caulking the ceiling of the ship, together with the advantage derived from the fothering sails, had now produced an effect so considerable, that on Sunday, the 7th of July, the original leakage was found to be reduced nearly four-fifths. During an hour, in which we were engaged in Divine service, the pumps were allowed to "stand;" two and a half feet of water, which in this interval flowed into the hold, was pumped out in twenty minutes.

After various alarms and careful attention to the leakage, together with the unremitting diligence of the crew in the use of the pumps, we descried land on the 23rd of July, and approached within three or four miles of the coast of Shetland. In the evening, the John having fulfilled the articles of agreement as far as was required, we sent the twelve men belonging to her crew on board, and after receiving from them a supply of fresh water, they left us with three cheers, and the usual display of colours. We were now left to sail by ourselves; our progress was in consequence rather slow. At daylight of the 27th, we were rejoiced with a sight of our port. Knowing the flow of water to be sufficient for the ship, and there being a probability of reaching the harbour before the tide was too much fallen, we pressed towards it with every sail we could set, and having received a pilot as we approached the pier, we immediately entered the harbour, and grounded at half-past five A.M. in a place of safety.

Thus, through the peculiar favour of God, by whose influence our perseverance was stimulated, and by whose blessing our contrivances were rendered effectual, happily terminated a voyage at once hazardous, disastrous, and interesting. Men whose lives have been exposed to dangers so fearful and imminent, may reasonably be expected to be influenced by a vivid sense of the nearness of eternity, and to feel the powers of the world to come. It is the prerogative of the Christian religion, whilst it prepares men for death, to take away undue apprehensions of it; to furnish consolation of unspeakable value, when it is present; and to light up the distant and unknown future, with the peace and happiness of the hope of eternal life. To the rude and courageous mariner, as well as to the inhabitants of refined and luxurious homes, God's message is one and the same. It is suitable, and worthy of acceptation, on sea and on land, in sickness and in health, when we expect instant removal from our present temporary dwelling-place, or look forward to the activities and cares of a protracted life. To every one of us the Almighty is saying, Repent, believe, and live—promising a free and complete pardon through the death of his Son, and engaging, to those who welcome and obey his message, that they shall live under the smile of His countenance and the protection of his power.

Intelligence relative to the distressed state of the ship, and the helplessness of her situation, reached Whitby the day before us, and, in consequence of exaggerations respecting the loss of the crew, involved every interested person in deep distress. Throughout the town, and in a great measure throughout the neighbourhood, the event was considered as a general calamity. Some of the underwriters on the Esk, I was informed, had offered sixty per cent. for the re-assurance of the sums for which they were liable, but such was the nature of the risk, as ascertained from the information of some ships' crews, by whom we had been assisted, that no one would undertake the assurance, even at this extraordinary premium. The hearty congratulations I received on landing, from every acquaintance, were almost overwhelming, and these, with the enhanced endearments of my affectionate and enraptured wife, amply repaid for all the toils and anxieties of mind that I had endured.

On the tide ebbing out, the Esk was left dry, on which, for the first time since the accident, the whole of the water was drawn out of the hold by the pumps. The next tide, the ship was removed above the bridge to a place of perfect safety, where the pumps being neglected, the water in the course of two tides rose nearly as high within as without. After the cargo was discharged, the ship was put into dock, and it was found that, excepting the loss of twenty-two feet of keel, and the removal of a piece of the starboard garboard strake, nine feet in length, with a portion of dead-wood brought home upon deck, no other damage of consequence had been produced by the ice. The whole expense of repairs did not, I believe, exceed £200. Though the sacrifice of nearly one-half of our cargo was a considerable disappointment to the owners, who had been apprized of our success in fishery, yet, when compared with the salvage, which might have been demanded had no contract been entered into for the assistance of the John, the sacrifice appeared to have been a material benefit, having been productive of the saving of perhaps £2,000. The approbation of my conduct by the owners, Messrs. Fishburn and Brodrick, was testified by their presenting to me a gratuity of £50; and the sense entertained by the Whitby underwriters, of the preservation of the ship, was pleasingly manifested by a present of a handsome piece of plate.

I may add, in conclusion, that the whole of my crew, excepting one individual, returned from this adventurous and trying voyage in safety, and in general in a good state of health. Several of the men, indeed, were affected more or less by the excessive fatigue, and by the painful exposure to cold and damp, while resting on the ice; but all of them were, in a great measure, restored before our arrival at home, excepting one man ; he, poor fellow, being of a weak constitution, suffered severely from the inclement exposure, and died soon after he arrived in port.

THE RELIGIOUS TRACT SOCIETY: INSTITUTED 1799